

EXHIBIT 048-G

***Inpria Corporation v. Lam Research Corp.*, Case No. 1-22-cv-01359-CJB**
Exhibit 048-G - Invalidity Claim Chart for U.S. Patent No. 11,537,048

WIPO Publication No. 2020/263750 (“Berney”) published **December 30, 2020**. Berney is therefore prior art to the ’048 Patent under AIA 35 U.S.C. 102(a)(1).¹

Molloy, Kieran C. “Precursors for the formation of tin (IV) oxide and related materials.” *Journal of Chemical Research* 2008.10 (2008): 549-554 (“Molloy”) published on **October 21, 2008**. Molloy is therefore prior art to the ’048 Patent under AIA 35 U.S.C. 102(a)(1).

Berney renders anticipates and/or renders Asserted Claims 1-10, 14-20 of the ’048 Patent obvious alone, in combination with the Molloy, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified in Defendant’s Invalidity Contentions, including as set forth in this chart.

With respect to the obviousness of the asserted claims under 35 U.S.C. § 103, one or more of the principles enumerated by the United States Supreme Court in *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007) apply, including: (a) combining various claimed elements known in the prior art according to known methods to yield a predictable result; (b) making a simple substitution of one or more known elements for another to obtain a predictable result; (c) using a known technique to improve a similar device or method in the same way; (d) applying a known technique to a known device or method ready for improvement to yield a predictable result; (e) choosing from a finite number of identified, predictable solutions with a reasonable expectation of success or, in other words, the solution was one which was “obvious to try”; (f) a known work in one field of endeavor prompting variations of it for use either in the same field or a different field based on given design incentives or other market forces in which the variations were predictable to one of ordinary skill in the art; and/or (g) a teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine the teachings of various prior art references to arrive at the claimed invention. It would have been obvious to a person of ordinary skill in the art to combine the Berney with the general knowledge of a person of ordinary skill in the art, and/or one or more of the references identified in Defendant’s Invalidity Contentions in accordance with the principles and rationales set forth above.

Beyond the specific motivations identified in the cited references, motivation to modify and combine particular references comes from: (a) the nature of the problem being solved; (b) the teachings of the prior art; (c) the knowledge of persons of ordinary skill in the art; (d)

¹ Berney is available as prior art under 35 U.S.C. 102(a)(1) because the earliest priority date of challenged claims 1-10, 14-20 of the ’048 Patent is January 21, 2021, which is the first date that the first version of Figure 16 and related text were added to the specification.

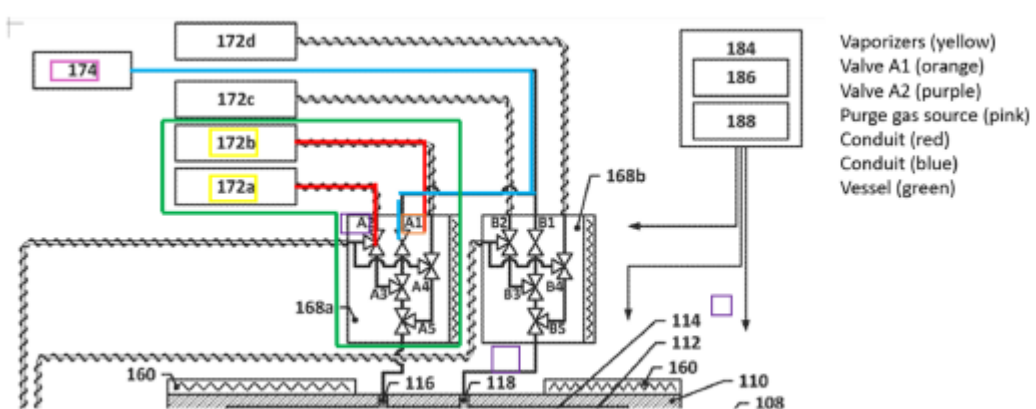
the fact that the references address the same or similar technical issues as the '048 patent; and (e) considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility to combine the various teachings.

This claim chart is meant to illustrate one example of how the asserted claims are invalid for obviousness. By not discussing portions of a reference in the claim chart below, Defendant does not waive its right to rely on these portions of the reference. Instead, Defendant expressly reserves the right to rely on any and all portions of the cited references. These contentions are not an admission by Defendant that any accused materials are covered by or infringe the asserted claims of the '048 patent, particularly after the claims are construed by the Court. These contentions are not an admission by Defendant as to the proper scope of any asserted claim, the proper construction of any term in any asserted claim, or whether particular elements may be construed at all, or instead, are indefinite. Defendant reserves the right to modify, amend, or supplement these contentions as additional information becomes available during the course of this action and in view of any applicable claim construction order from the Court.

'048 Patent Claims	Disclosure of Prior Art
Claim 1	
[1p] A system comprising: a deposition chamber having an interior isolated from the ambient atmosphere	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses “an example dry deposition apparatus for generating EUV sensitive photoresist layers.” Berney, ¶0009, Fig. 1. Berney thus discloses “[a] system comprising.” Berney, ¶¶0072, 0074. Berney’s “apparatus 100...has a processing chamber 102,” as shown in Figure 1 below. Berney, ¶0038. Berney’s processing chamber may be “isolated from the environment” using a gate valve to seal the wafer transfer passage. <i>Id.</i> A POSA would know that the other side of the gate valve (or, if present, more than one gate valves or other mechanisms) is at ambient atmosphere, and sealing the wafer transfer passage would isolate the processing chamber from the ambient atmosphere. <i>Id.</i>, ¶0018. Berney also describes the environment for conventional spin-on photoresists (not vapor deposition), which are applied in an “an atmospheric environment, e.g., at typical atmospheric pressures.” <i>Id.</i>, ¶ 0036. Berney also discloses that dry deposition processes “may be performed in a range of different temperature and pressure environments, and are often performed at sub-atmospheric conditions.” <i>Id.</i>, ¶0014. A POSA would

'048 Patent Claims	Disclosure of Prior Art
	understand that a deposition chamber would be isolated from the ambient atmosphere to attain different temperature and pressure environments, including sub-atmospheric conditions, for processing. <i>Id.</i>, ¶¶0018, 0037. Figure 1 Berney, Figure 1 (annotated).
[1a] a substrate within the interior of the deposition chamber configured to receive a	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney's substrate is "passed...into the interior of the processing chamber 102," as shown below. Berney, ¶0038. The substrate "may include any material construct suitable for photolithographic processing." <i>Id.</i>, ¶0019. "The EUV-sensitive metal or metal oxide-containing film may be dry-deposited on the substrate." <i>Id.</i>, ¶0017. "EUV-patternable

'048 Patent Claims	Disclosure of Prior Art
maintained at a temperature of less than 200° C.;	Berney teaches that the substrate temperature can be maintained at a temperature “from 0°C to 250°C, or from ambient temperature (23 °C) to 150 °C. ” Berney, ¶0030.
[1c] an inlet into the deposition chamber;	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney’s “showerhead 110...includes a first plenum 112 that is provided process gas via a first inlet 116,” and “[e]ach plenum may have a corresponding set of gas distribution ports that fluidically connect the respective plenum with the reaction space 120,” as shown below. Berney, ¶0047. Showerhead 110 (green) First valve manifold 168a (red) Second valve manifold 168b (blue) First inlet 116 (purple) Second inlet 116 (orange) Figure 1
	Berney, Figure 1 (annotated).

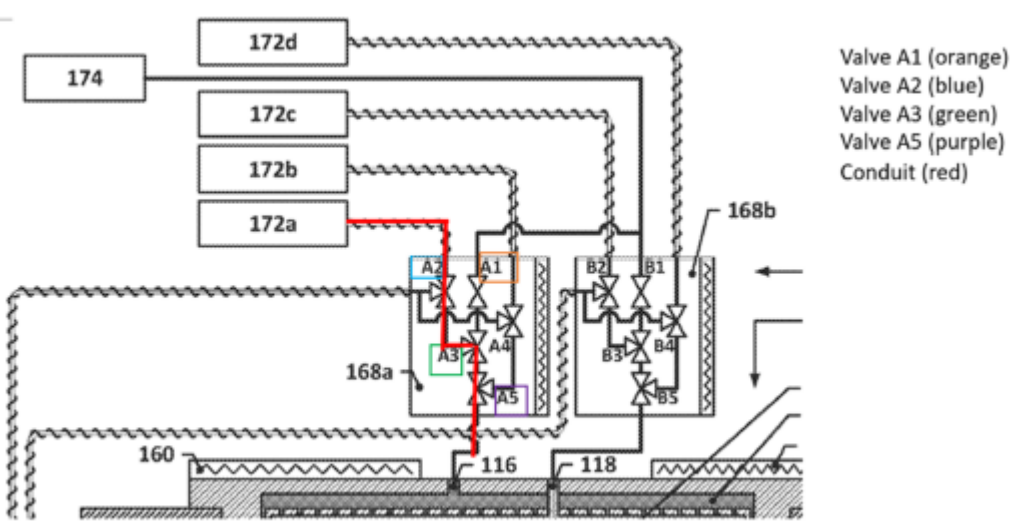
'048 Patent Claims	Disclosure of Prior Art
[1d] structure configured to deliver flow from a supply of an inert gas;	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses an apparatus for vapor deposition including conduits and a manifold that can cause the flow of a purge gas. Berney, ¶0052. The purge gas can be “any suitable inert gas.” <i>Id.</i>, ¶0050. Berney’s valves cause the flow of a purge gas: “...it may be desirable to purge one of the vapors...by actuating the valves A1, A3, and A5 so as to cause the purge gas from the purge gas source 174 to be flowed into the first inlet 116.” <i>Id.</i>, ¶0053. The purge gas source also has a conduit that delivers flow of the purge gas to first valve manifold 168a, as shown in Figure 1 below. Since the claim element of the “structure configured to deliver flow” does not require the “structure” connecting to anything, a POSA would understand that the “structure” is simply a conduit for delivering a supply of inert gas, and that the valves and conduit disclosed by Berney are “structures configured to deliver flow.” Moreover, although the limitation does not require that the structure includes the precursor vessel as Inpria seems to argue, a POSA would appreciate that the precursor source includes the precursor vessel and its mixer valve manifold, and as such the source of inert gas connects through a conduit to the precursor source (that includes its mixer/valve), as shown in Figure 1 below. 

'048 Patent Claims	Disclosure of Prior Art
[1e] a supply of an organotin composition comprising a compound described by the formula $R\text{Sn}X_3$, where R is an organic ligand with 1-31 carbon atoms and is bound to Sn with a metal-carbon bond and	Berney, Figure 1 (annotated and cropped). Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses “a supply of an organotin composition” because it discloses inlets 116 inlets 118 that “may be provided processing gases via a gas supply system, which may be configured to provide one or more organometallic precursors...” Berney, ¶0048. Moreover, the organometallic precursors may be “dispensed from their respective vaporizers 172...into the reaction space 120.” <i>Id.</i>, ¶64. Berney’s organometallic precursors disclose the “organotin composition.” In particular, Berney’s precursors can be of “formula MaRbLc where M is a metal with a high EUV absorption cross-section; R is alkyl5...; L is a ligand, ion or other moiety which is reactive with the counter-reactant; $a > 1$; $b > 1$; and $c > 1$.” <i>Id.</i>, ¶0022. The metal M can be tin. <i>Id.</i>, ¶¶0021, 0023. R may be alkyl groups such as isopropyl (3 carbon atoms), t-butyl (4 carbon atoms), and other alkyl groups with 3-5 carbon atoms. <i>Id.</i>, ¶0023. A POSA would understand that, in formula MaRbLc, the alkyl group R is bound to the metal M with a metal-carbon bond. <i>Id.</i>, ¶0022.
[1f] wherein X is selected from the group consisting of alkylamido or dialkylamido ($-\text{NR}^1\text{R}^2$, where R^1 and R^2 are independently hydrocarbon groups with 1-10 carbon atoms or hydrogen), siloxo ($-\text{OSiR}^1\text{R}^2\text{R}^3$, where R^1, R^2, R^3 are	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses that ligand L can be “a moiety that is an amine (such as a dialkylamino or monoalkylamino group)” or “an alkoxy group.” Berney, ¶0023. A POSA would understand that the ligand L of Berney is analogous to the claimed X in $\text{R}\text{Sn}\text{X}_3$. Berney also discloses specific examples of tin precursors with dialkylamido and alkoxy groups of X: “where M is tin, such precursors include...isopropyl(tris)dimethylamino tin6...and... alkyl(tris)(t-butoxy) tin compounds such as t-butyl tris(t-butoxy) tin7.” Berney, ¶0024. A POSA would understand that Berney’s dimethylamino is the claimed dialkylamido ($-\text{NR}^1\text{R}^2$, where R^1 and R^2 are each methyl (hydrocarbon group with 1 carbon atom)), and Berney’s t-butoxy is the claimed alkoxy ($-\text{OR}$, where

'048 Patent Claims	Disclosure of Prior Art
independently hydrocarbon groups with 1-10 carbon atoms), silylamido ($\text{—N}(\text{SiR}^1_3)(\text{R}^2)$, where R^1 and R^2 are independently hydrocarbon groups with 1-10 carbon atoms), disilylamido ($\text{—N}(\text{SiR}^1_3)(\text{SiR}^2_3)$ where R^1 and R^2 are independently hydrocarbon groups with 1-10 carbon atoms), alkoxo and aryloxo (—OR , where R is an alkyl or aryl group with 1-10 carbon atoms), azido (—N_3), alkynido ($\text{—C}\equiv\text{CR}$, where R is a hydrocarbon group with 1-9	R is t-butyl (hydrocarbon group with 4 carbon atoms). '048 Patent, claim 1. Berney also discloses the “organometallic precursors may be partially fluorinated,” Berney, ¶0024, which discloses the “fluorinated analogues thereof.”

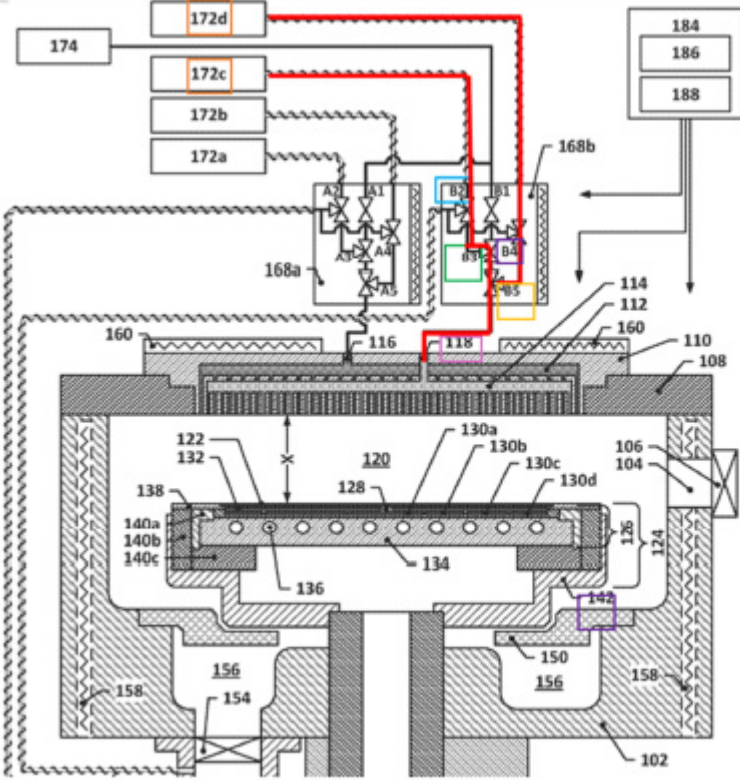
'048 Patent Claims	Disclosure of Prior Art
carbon atoms), amidato (— $\text{NR}^1(\text{COR}^2)$ where R^1 and R^2 are independently hydrocarbon groups with 1-7 carbon atoms or hydrogen), amidinato (— $\text{NR}^1\text{C}(\text{NR}^2)\text{R}^3$) where R^1 and R^2 are independently hydrocarbon groups with 1-8 carbon atoms or hydrogen), imido (— $\text{N}(\text{COR}^1)(\text{COR}^2)$, where R^1 and R^2 are independently hydrocarbon groups with 1-8 carbon atoms or hydrogen), or fluorinated analogues thereof, or	

'048 Patent Claims	Disclosure of Prior Art
combinations thereof	
[1g] structure configured to deliver flow of a first precursor vapor from the supply of the organotin compound with the inert gas as a carrier gas to the inlet	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses simultaneously flowing vapor from a vaporizer with a purge gas. Berney, ¶0053. The purge gas is “nitrogen, argon, or other suitably inert gas.” <i>Id.</i>, ¶0050. Berney performs the function: “to deliver flow of a first precursor vapor from the supply of the organotin compound with the inert gas as a carrier gas to the inlet.” Berney discloses an apparatus for vapor deposition that includes a valve manifold that causes vapors from a supply of organometallic vapor to flow. Berney, ¶52. These vapors may flow in tandem with a purge gas. Berney, ¶53 Berney discloses an apparatus for performing vapor deposition that includes a conduit (or series of conduits) fluidically connecting a vessel (i.e. “first vaporizer 172a”) to an inlet (i.e., “first inlet 116”) by way of three valves (valve A2, valve A3, and valve A5), as shown in Figure 1 below. Berney, ¶¶0049-0050. A POSA would therefore understand that Berney discloses a conduit. Berney discloses that the flow from the vaporizer can be delivered through the conduit (or series of conduits) and valves to the first inlet: “[T]o flow vapor from the first vaporizer 172a into the reaction space 120, the valve A2 may be actuated to cause the vapor from the first vaporizer 172a to first flow into the first bypass line 170a. This flow may be maintained for a period of time After sufficient time has passed..., valves A2, A3, and A5 may be actuated to cause the vapor flow from the first vaporizer 172a to be directed to the first inlet.” <i>Id.</i>, ¶0053.

'048 Patent Claims	Disclosure of Prior Art
	 Valve A1 (orange) Valve A2 (blue) Valve A3 (green) Valve A5 (purple) Conduit (red) Berney, Figure 1 (annotated and cropped).
1[h] to provide for formation of an organotin layer on the substrate surface within the deposition chamber; and	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses that “[t]he thin films are, in various embodiments, organometallic materials, for example organotin materials comprising SnOx, or other metal oxides materials/moieties,” which may be made “in a vapor phase reaction of an organometallic precursor with a counter-reactant.” Berney, ¶0021. Berney states that “gas streams...of organometallic precursor and source of counter-reactant may be introduced into a deposition chamber of a CVD apparatus, where they may mix and react in the gas phase to form agglomerated polymeric materials,” and “it is believed that the product from such vapor-phase reaction becomes heavier in molecular weight as metal atoms are crosslinked by counter-reactants, and is then condensed or otherwise deposited onto the substrate.” <i>Id.</i>, ¶0029
[1i] structure to deliver a second precursor vapor	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation.

'048 Patent Claims	Disclosure of Prior Art
comprising water, hydrogen peroxide or a combination thereof capable of reacting with the composition in the first precursor vapor	Berney performs the function: “to deliver a second precursor vapor comprising water, hydrogen peroxide or a combination thereof capable of reacting with the composition in the first precursor vapor.” Berney discloses an apparatus for vapor deposition that includes vaporizers for dispensing counter reactants. Berney, ¶0064. Counter-reactants react with an organometallic precursor, and may be water or hydrogen peroxide. <i>Id.</i>, ¶0025. The structure for these Contentions as tied to Figure 16 of the '048 Patent is a conduit 174 connecting a source of a “second precursor vapor comprising water, hydrogen peroxide or a combination thereof” to inlet 154 of deposition chamber 151 and equivalents thereof or, if not tied to Figure 16, a conduit (like a pipe) connecting a source of a “second precursor vapor comprising water, hydrogen peroxide or a combination thereof” to an inlet of a deposition chamber and equivalents thereof. Berney discloses an apparatus for performing vapor deposition that includes a conduit fluidically connecting a vessel to an inlet by way of valves: “Valve A2 may, for example, be a three-way valve that has one port fluidically connected with a first vaporizer 172a... and a third port fluidically connected with a port on another 3-way valve A3...One of the other ports on valve A5 may be fluidically connected with the first inlet 116 while the remaining port on valve A5 may be fluidically connected with one of the remaining ports on the valve A3.” Berney, ¶50. Berney discloses that a “second valve manifold 168b may be controlled in a similar manner, e.g., by controlling valves B1-B5, to provide vapors from vaporizers 172c and 172d to the second inlet 118.” <i>Id.</i>, ¶0054. Accordingly, a POSA would understand that valves B1-B5 can function analogously to valves A1-A5, and vapors from vaporizers 172c and 172d can flow to inlet 118 which connects to processing chamber 102. Berney, ¶0049. Berney’s “a second valve manifold 168b may be configured to provide counter-reactants to the second inlet 118.” Berney, ¶0049. Counter-reactants can include “water, peroxides (e.g., hydrogen peroxide)...” <i>Id.</i>, ¶0025. A POSA would understand that vaporizers 172c and 172d, which are connected to second valve manifold 168b, provide counter reactants such as water or hydrogen peroxide to the second inlet 118. <i>Id.</i>, ¶0049. Berney discloses that “a second valve manifold 168b may be configured to provide counter-reactants to the second inlet 118,” as shown in Figure 1 below. Berney ¶0049. “[T]he second inlet 118...may be provided processing gases via a gas supply system, which may be configured to provide...one or more counterreactants...” <i>Id.</i>, ¶0048. Counter-reactants can be “dispensed from their respective vaporizers 172...” <i>Id.</i>, ¶0064.

'048 Patent Claims	Disclosure of Prior Art
	Berney defines “fluidically connected” as follows: “For the purposes of this disclosure, the term ‘fluidically connected’ is used with respect to volumes, plenums, holes, etc., that may be connected with one another in order to form a fluidic connection, similar to how the term “electrically connected” is used with respect to components that are connected together to form an electric connection.” Berney, ¶51. “...[T]he second inlet 118...may be provided processing gases via a gas supply system, which may be configured to provide...one or more counter-reactants...” <i>Id.</i>, ¶ 0048. Counter-reactants can be “dispensed from their respective vaporizers 172...” <i>Id.</i>, ¶ 0064 Thus, Berney discloses a vessel (i.e., “second vaporizer 172b”) and the conduit extending from the vessel to the inlet (i.e., “second inlet 118”). And Berney discloses “a structure configured to deliver flow of a first precursor vapor from the supply of the organotin compound with the inert gas as a carrier gas to the inlet.” <i>Id.</i>, ¶¶0130-0136.

'048 Patent Claims	Disclosure of Prior Art
	 Vaporizers (orange) Valve B2 (blue) Valve B3 (green) Valve B4 (purple) Valve B5 (yellow) Conduit (red) Inlet 118 (pink) Berney, Figure 1 (annotated and zoomed in).
[1j] under conditions in the deposition chamber to form a composition with non-volatile components and	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney's "gas streams...of organometallic precursor and source of counter-reactant may be introduced into a deposition chamber of a CVD apparatus, where they may mix and react in the gas phase to form agglomerated polymeric materials," and "the product from such vapor-phase reaction becomes heavier in molecular weight as metal atoms are crosslinked by counter-reactants, and is then condensed or otherwise deposited onto the

'048 Patent Claims	Disclosure of Prior Art
a volatile component comprising hydrolysis reaction product with X	substrate. ” Berney, ¶0029. A POSA would understand that the product of the reaction between the organometallic precursor and counter-reactant is a composition with non-volatile components deposited onto the substrate (assuming the components that have condensed onto the substrate are no longer a vapor), and the vapor-phase reaction also produces a volatile component with X through a hydrolysis reaction.
[1k] wherein the substrate is configured with a surface to receive the non-volatile components of the composition.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney’s film constituent is delivered “to the substrate as a vapor-phase reactant, where it then condenses or adsorbs onto the exposed surface of the substrate. ” Berney, ¶0014. “[T]he substrate 122 temperature may be controlled to a level that promotes condensation, or at least deposition, of the reactants on the substrate 122.” <i>Id.</i> , ¶0056. From this, a POSA would understand the substrate is configured with a surface to receive the non-volatile components of the composition.
Claim 2	
The system of claim 1 wherein the substrate comprises a silicon wafer.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 2 depends on claim 1 and recites that “the substrate comprises a silicon wafer.” Berney discloses that “such substrates may be silicon wafers.” Berney, ¶0019.
Claim 3	
The system of claim 1 wherein the inert gas comprises nitrogen or argon.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 3 depends on claim 1 and recites that “the inert gas comprises nitrogen or argon. ” Berney discloses that examples of a purge gas source includes “ nitrogen, argon, or other suitably inert gas.” Berney, ¶0050.
Claim 4	
The system of claim 1 wherein the structure	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation.

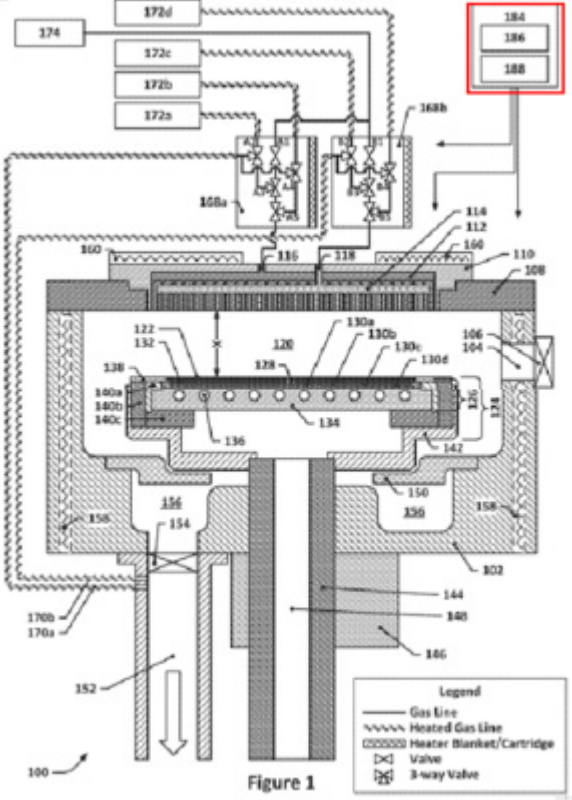
'048 Patent Claims	Disclosure of Prior Art
configured to deliver flow comprises an aerosol generator configured to generate an aerosol from a liquid comprising the organotin compound, a vaporization chamber configured to receive an injection of organotin compound, a flash evaporator configured to evaporate the organotin compound, <u>or</u> a bubbler configured for bubbling an inert	Berney discloses that organometallic precursors can be “dispensed from their respective vaporizers 172...” Berney ¶0064. A POSA would understand the vaporizer to be any of the “aerosol generator, vaporization chamber, a flash evaporator, or bubbler” that converts the organotin into a vapor. If Inpria contends this limitation refers to a class of structures for delivering flow (i.e., an interconnected vessel and conduit), Berney discloses this structure as discussed <i>supra</i> for this limitation. At a minimum, Berney discloses an equivalent structure because the vaporizer delivers flow. <i>Id.</i>

'048 Patent Claims	Disclosure of Prior Art
carrier gas through a liquid comprising the organotin compound, and	
wherein the deposition on the surface of the substrate comprises chemical vapor deposition.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney discloses that “[s]uitable processes for forming... polymerized organometallic material on a substrate include, for example, depositing it using chemical vapor deposition....” Berney ¶0027.
Claim 5	
The system of claim 1 wherein the second precursor vapor comprises water vapor.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 5 depends on claim 1 and recites that “the second precursor vapor comprises water vapor.” Berney discloses that the counter-reactants provided via the supply system can include water.” Berney, ¶¶0025, 0048.
Claim 6	
The system of claim 1 further comprising a flow comprising a third precursor vapor comprising a composition represented by the formula	Berney and/or Molloy, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney and Molloy discloses claim 6, which depends on claim 1 and recites “further comprising a flow comprising a third precursor vapor comprising a composition represented by the formula ML_v, where v is $2 \leq v \leq 6$ and L is an oxidizable ligand or a ligand having a hydrolysable M-L bond or a combination thereof, and M is a metal selected from groups 2-16 of the periodic table.” Berney and Molloy discloses each limitation of claim 1 for the reasons discussed above.

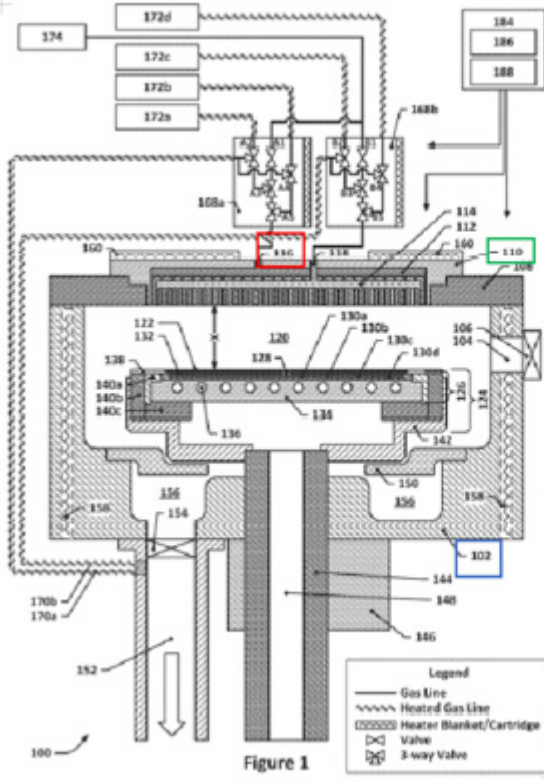
'048 Patent Claims	Disclosure of Prior Art
ML_v, where v is 2 ≤ v ≤ 6 and L is an oxidizable ligand or a ligand having a hydrolysable M-L bond or a combination thereof, and M is a metal selected from groups 2-16 of the periodic table.	Berney discloses that “more than one organometallic precursor is included in the vapor stream.” Berney, ¶0017. And “apparatus 100...is configured to provide multiple organometallic precursors. <i>Id.</i>, ¶0017. From this, a POSA would understand Berney to disclose at least a third precursor vapor. Berney also discloses applying a “second organometallic precursor (different from the first)” on the substrate. Berney, ¶0066. Although Berney does not disclose a composition represented by the formula ML_v, a POSA would have known that such compounds were used as precursors in vapor deposition techniques and would have expected that such compositions could successfully be included in a third precursor vapor. Molloy discloses inorganic tin compounds for CVD purposes, including SnMe₄ a “precursor of choice” in dual-source CVD processes that provide films with desirable properties produced with high deposition rates (“polycrystalline with a refractive index of 2.00–2.10, have visible-light transmission of 84% and resistivity of 0.6 Ωcm” (citations omitted)) and deposition temperatures as low as 30°C. Molloy, 549-550. A POSA would further understand that SnMe₄ is a composition represented by the formula ML_v, where M is tin (Sn; group 14 of the periodic table), v is 4, and L is methyl (Me), which is a ligand having a hydrolysable M-L bond. A POSA would appreciate that Berney and Molloy are analogous art, and would have been motivated to combine them because Berney discloses beneficial properties with using a second organometallic precursor, and Molloy teaches organometallic (e.g., organotin) precursors. A POSA would have been motivated to select SnMe₄ (i.e., a compound of formula ML_v) for inclusion in the third vapor precursor in order to obtain a film with the desirable properties described by Molloy. Finally, a POSA would have had a reasonable expectation of success that Molloy’s precursors could form a film using the apparatus of Berney since Molloy teaches that SnMe₄ is a precursor for vapor deposition methods.
Claim 7	
The system of claim 6 wherein the third precursor vapor comprises SNL₄.	Berney and/or Molloy, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Berney and Molloy discloses claim 7, which depends on claim 6 and recites that “the third precursor vapor comprises SnL₄.”

'048 Patent Claims	Disclosure of Prior Art
	Berney discloses that “more than one organometallic precursor is included in the vapor stream.” Berney, ¶0017. Also “apparatus 100...is configured to provide multiple organometallic precursors. Berney, ¶0017. From this, a POSA would understand Berney to disclose at least a third precursor vapor. Berney also discloses applying a “second organometallic precursor (different from the first)” on the substrate. Berney, ¶0066. Berney discloses that using a second organometallic precursor can provide beneficial properties during exposure, such as offsetting potential gradient effects. Berney, ¶0066. A POSA would have known that such compounds were being used as precursors for vapor deposition and would have had an expectation that the compositions of formula ML_v could successfully be included in a third precursor vapor. <i>Id.</i> Molloy discloses organotin compounds for CVD purposes, including SnMe₄ a “precursor of choice” in dual-source CVD processes that provide films with desirable properties produced with high deposition rates (“polycrystalline with a refractive index of 2.00–2.10, have visible-light transmission of 84% and resistivity of 0.6 Ωcm” (citations omitted)) and deposition temperatures as low as 30°C. Molloy, 549-550. A POSA would further understand that SnMe₄ is a composition represented by the formula SnL₄, where M is tin (Sn; group 14 of the periodic table) and L is methyl (Me), which is a ligand having a hydrolysable M-L bond. A POSA would appreciate that Berney and Molloy are analogous art, and would have been motivated to combine them because Berney discloses the benefits of using a second organometallic precursor, and Molloy teaches organometallic (e.g. organotin) precursors. A POSA would have been motivated to select SnMe₄ (i.e. a compound of formula SnL₄) for inclusion in the third vapor precursor in order to obtain a film with the desirable properties described by Molloy. Finally, a POSA would have had a reasonable expectation of success that Molloy’s precursors could form a film using Berney’s apparatus since Molloy teaches that SnMe₄ is a precursor for vapor deposition methods.
Claim 8	
The system of claim 1 wherein the interior has a pressure from about 0.01 Torr to about 25 Torr.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 8 depends on claim 1 and recites “the interior has a pressure from about 0.01 Torr to about 25 Torr.” Berney’s “CVD process is generally conducted at reduced pressures, such as from 10 milliTorr to 10 Torr,” including “0.5

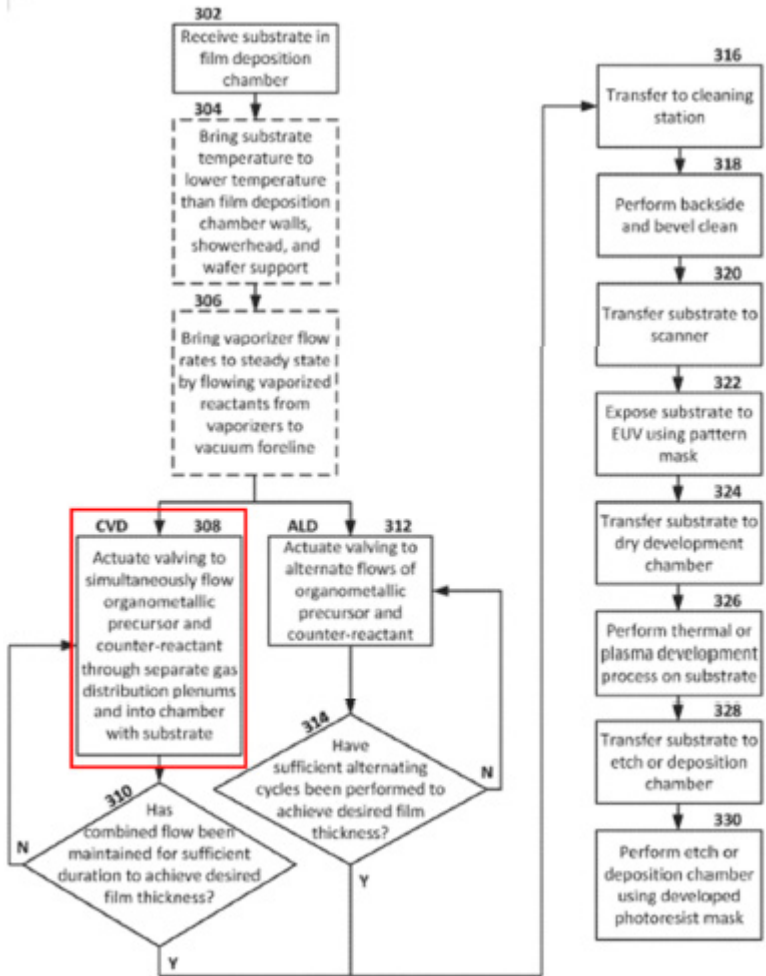
'048 Patent Claims	Disclosure of Prior Art
	to 2 Torr.” Berney, ¶0030. Thus, a POSA would understand that Berney’s CVD process is conducted at the reduced pressures of “0.5 to 2 Torr” which falls within the claimed range.
Claim 9	
The system of claim 1 wherein the interior has a temperature from about 40° C. to about 175° C.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 9 depends on claim 1 and recites that “the interior has a temperature from about 40° C. to about 175° C.” Berney discloses “maintain[ing] the temperature of the [chamber’s] interior wall surfaces...to between 80 °C and 120 °C.” Berney, ¶0062
Claim 10	
The system of claim 1 comprising a configuration providing for selection of the pressure and/or the temperature in the deposition chamber.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 10 depends on claim 1 and recites “comprising a configuration providing for selection of the pressure and/or the temperature in the deposition chamber.” This limitation is a MPF term. Berney performs the function: “selection of the pressure and/or the temperature in the deposition chamber.” Berney discloses a controller that may be programmed to control...the...temperature settings (e.g., heating and/or cooling), pressure settings... <i>Id.</i>, ¶0077. The structure for this Petition is a first and second vessel and/or a controller and equivalents thereof. Berney discloses a “controller 184 may control the various heater systems of the apparatus 100 to maintain the temperature of the [chamber’s] interior wall surfaces” as shown in Figure 1 below. Berney, ¶0062; <i>id.</i>, ¶0077.

'048 Patent Claims	Disclosure of Prior Art
	 Berney, Figure 1 (annotated).
Claim 11	
The system of claim 1 wherein the flow comprises a vapor.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 11 depends on claim 1 and recites “the flow comprises a vapor.” Berney discloses that “it may be desirable to simultaneously flow vapor from one of the vaporizers...in tandem with flowing gas from the purge gas.” Berney, ¶0053. The purge gas can be “nitrogen [or] argon.” <i>Id.</i>, ¶0050. Accordingly, Berney discloses this limitation.

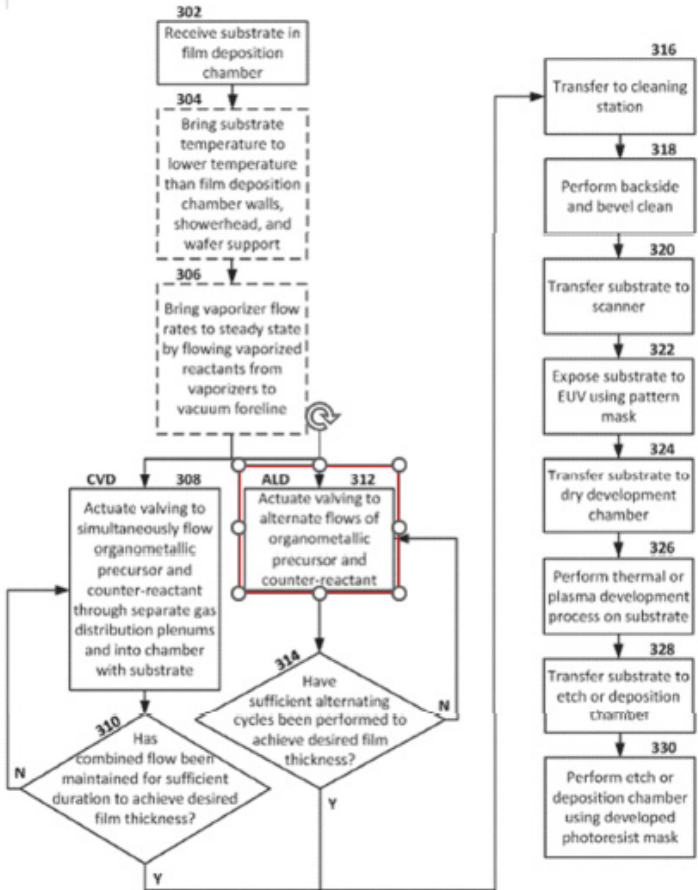
'048 Patent Claims	Disclosure of Prior Art
Claim 12	
The system of claim 1 wherein the structure configured to deliver flow comprises one or more vapor inputting structures.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 12 depends on claim 1 and recites “the structure configured to deliver flow comprises one or more vapor inputting structures.” The vapor inputting structure limitations in this and claims 13-17 are MPF terms whose function is “vapor inputting” and structure is “an inlet for inputting a vapor and equivalents thereof.” Berney performs the function: “vapor inputting.” Berney discloses valves and showerhead for providing flow of gas. Berney, ¶¶0053, 0047. Berney discloses a first inlet 116 that provides gas to a reaction space via a showerhead 110, as shown as Figure 1 below, and “[t]he showerhead 110 may...have more than two plenums, although two plenums is generally the minimum required to maintain separation between the organometallic precursor and the counter-reactant prior to release of the organometallic precursor and the counter-reactant into the reaction space 120 of the processing chamber 102.” <i>Id.</i>, ¶0047. Berney also discloses multiple valves that deliver flow of a purge gas: “the first valve manifold 168a...includes multiple valves A1-A5,” and “the valve A1...may be fluidically interposed between the valve A3 and a purge gas source 174.” <i>Id.</i>, ¶0063.

'048 Patent Claims	Disclosure of Prior Art
	 Process Chamber 102 blue Inlet 116 – red Showerhead 110 - green Figure 1 Legend — Gas Line ~~~~~ Heated Gas Line [] Heater Blanket/Cartridge [] Valve [] 3-way Valve Berney, Figure 1 (annotated).
Claim 13	
The system of claim 12 wherein the vapor inputting structures provide for	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 13 depends on claim 12 and recites “the vapor inputting structure provide for control of the flow.” Berney’s “gas flow from the vaporizers 172 supplying the gas to be used in the dry deposition process may be initiated and allowed to reach steady state, e.g., by causing the valves A1-A5 ... to be selectively actuated...” <i>Id.</i>,

'048 Patent Claims	Disclosure of Prior Art
control of the flow.	¶0063. Therefore, Berney teaches the vapor inputting structure (i.e., “valves A1-A5”) provide for control of the flow (i.e., “gas flow...may be initiated and allowed to reach steady state”).
Claim 14	
The system of claim 1 wherein a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow at the same time.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 14 depends from claim 1 and recites “a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow at the same time.” Berney discloses a first structure that performs the function of “deliver[ing] a first vapor flow,” and a second structure that performs the function of “deliver[ing] a second vapor flow at the same time.” Berney discloses that “the controller may be configured to cause an organometallic precursor and a corresponding counter-reactant to be simultaneously dispensed from their respective vaporizers 172 and through respective plenums of the showerhead 110 into the reaction space 120 for a given duration of time” as described in block 308 of Figure 3 below. Berney, ¶0064. Berney also discloses “a controller having one or more processors...to a) cause...a first valve...to be actuated to cause a vapor-phase of a first organometallic precursor to be flowed...into the reaction space...and b) cause...a second valve...to be actuated to cause a vapor-phase of a first counter reactant to be flowed...into the reaction space...” <i>Id.</i>, 32:1-23. Berney discloses “perform[ing] (a) and (b) simultaneously.” <i>Id.</i>, 34:12. From this, a POSA would understand Berney to disclose a first vapor inputting structure (i.e., “a first valve”) is configured to deliver a first vapor flow (i.e., “a vapor-phase of a first organometallic precursor”) and a second vapor inputting structure (i.e., “a second valve”) is configured to deliver a second vapor flow (i.e., “a vapor-phase of a first counter reactant”), wherein the first vapor flow and the second vapor flow are at the same time (i.e., “cause an organometallic precursor and a corresponding counter-reactant to be simultaneously dispensed”; “perform[ing] (a) and (b) simultaneously”).

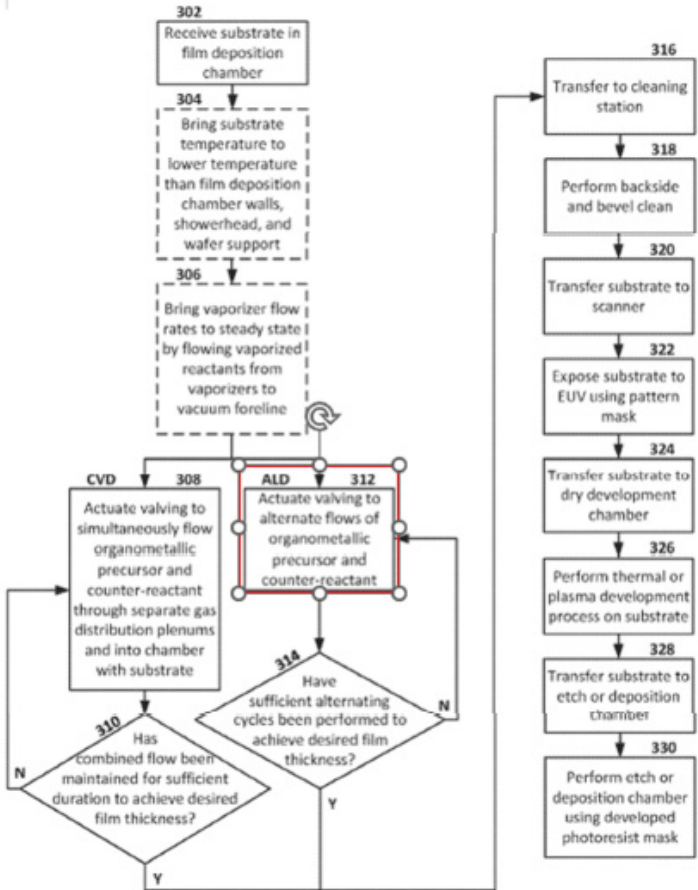
'048 Patent Claims	Disclosure of Prior Art
	 Figure 3 Berney, Figure 3 (annotated).
Claim 15	

'048 Patent Claims	Disclosure of Prior Art
The system of claim 1 wherein a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow, wherein the first vapor flow and the second vapor flow are sequential.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 15 depends on claim 1 and recites “a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow, wherein the first vapor flow and the second vapor flow are sequential.” Berney’s “valving of the apparatus 100 may be actuated to <i>alternate</i> flows of the organometallic precursor and the corresponding counter-reactant, e.g, first flow the organometallic precursor through the showerhead 110 and then stop the flow of the organometallic precursor and start the flow of the counterreactant through the showerhead 110” as described in Figure 3’s block 312 (below). <i>Id.</i>, ¶0065. Berney also discloses “a controller having one or more processors...to a) cause...a first valve...to be actuated to cause a vapor-phase of a first organometallic precursor to be flowed...into the reaction space...and b) cause...a second valve...to be actuated to cause a vapor-phase of a first counter reactant to be flowed...into the reaction space...” <i>Id.</i>, 32:10-23. Berney discloses “perform[ing] (a) and (b) in an alternating fashion...” <i>Id.</i>, 34:14-17. Figure 3 specifically identifies “[a]ctuate valving to alternate flows of organometallic precursor and counter-reactant.” <i>Id.</i>, Figure 3. From this, a POSA would understand Berney to disclose a first vapor inputting structure (i.e., “first valve”) is configured to deliver a first vapor flow (i.e., “vapor-phase of a first organometallic precursor”) and a second vapor inputting structure (i.e., “second valve”) is configured to deliver a second vapor flow (i.e., “vapor-phase of a first counter reactant”), wherein the first vapor flow and the second vapor flow are sequential (i.e., “stop the flow of the organometallic precursor and start the flow of the counter-reactant through the showerhead 110”; “alternate flows of organometallic precursor and counterreactant”).

'048 Patent Claims	Disclosure of Prior Art
	 Figure 3 Berney, Figure 3 (annotated).
Claim 16	
The system of claim 1 wherein	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation.

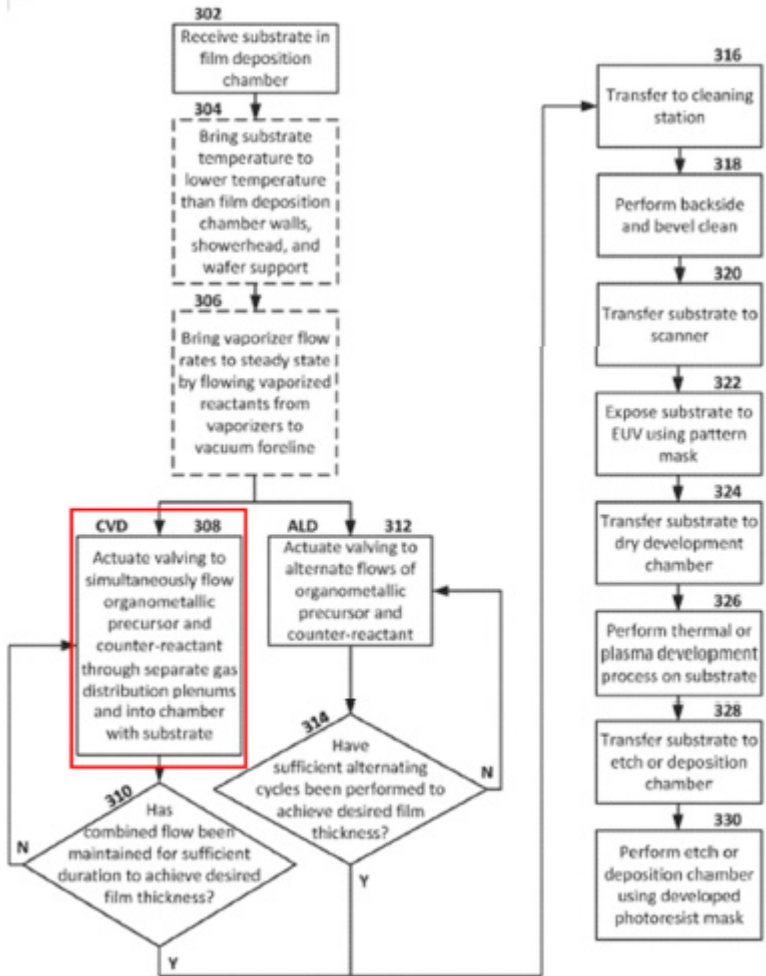
'048 Patent Claims	Disclosure of Prior Art
a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow, wherein the first vapor flow, the second vapor flow, and a third vapor flow are sequential.	Claim 16 depends on claim 1 and recites “a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow, wherein the first vapor flow, the second vapor flow, and a third vapor flow are sequential.” In Berney, “the valving of the apparatus 100 may be actuated to alternate flows of the organometallic precursor and the corresponding counter-reactant, e.g, first flow the organometallic precursor through the showerhead 110 and then stop the flow of the organometallic precursor and start the flow of the counterreactant through the showerhead 110” as described in block 312 of Figure 3 below. Berney, ¶0065. A POSA would understand that the valving represents a first vapor inputting structure and a second vapor inputting structure, and the first vapor flow (i.e., “vapor-phase of a first organometallic precursor”) and the second vapor flow (i.e., “vapor-phase of a first counter-reactant”) are sequential and form a sub-layer on the substrate. Berney also discloses “[a] second organometallic precursor (different from the first) may then be flowed across the substrate to create a second sub-layer.” Berney, ¶0066. A POSA would understand that first sub-layer would include the layer formed from the sequential flow of the first vapor flow (i.e., “vapor-phase of a first organometallic precursor”) and the second vapor flow (i.e., “vapor-phase of a first counter-reactant”), and therefore the third vapor flow (i.e., “vapor-phase of a second organometallic precursor”) is also sequential. Additionally, Berney’s apparatus for providing photoresist films includes “a controller...to a) cause...a first valve...to be actuated to cause a vapor-phase of a first organometallic precursor to be flowed...into the reaction space...and b) cause...a second valve...to be actuated to cause a vapor-phase of a first counterreactant to be flowed...into the reaction space...” Berney, 32:1-23. The apparatus also is capable of “controlling the one or more processors to: c) cause...a third valve...to be actuated to cause a vapor-phase of a second organometallic precursor to be flowed...into the reaction space...” <i>Id.</i>, 34:19-24. A POSA would understand that the first and second valves represent the first and second vapor inputting structure, respectively. Thus, a POSA would understand that Berney’s first vapor inputting structure (i.e. “first valve”) is configured to deliver a first vapor flow (i.e. “vapor-phase of a first organometallic precursor”) and a second vapor inputting structure (i.e., “second valve”) is configured to deliver a second vapor flow (i.e., “vapor-phase of a first counter reactant”), wherein the first vapor flow (i.e., “vapor-phase of a first organometallic precursor”), the second vapor flow (i.e., “vapor-phase

'048 Patent Claims	Disclosure of Prior Art
	of a first counter reactant”), and a third vapor flow (i.e., “vaporphase of a second organometallic precursor”) are sequential (i.e., “stop the flow of the organometallic precursor and start the flow of the counter-reactant through the showerhead 110”; “alternate flows of organometallic precursor and counterreactant”). A POSA would also understand that there are a limited number of obvious choices of continuous or alternating delivery methods, which would have been obvious-to-try based on the disclosure of Berney.

'048 Patent Claims	Disclosure of Prior Art
	 Figure 3 Berney, Figure 3 (annotated).
Claim 17	
The system of claim 1 wherein	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation.

'048 Patent Claims	Disclosure of Prior Art
a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow, wherein the first vapor flow and the second vapor flow are at the same time and a third vapor flow is sequential.	Claim 17 depends on claim 1 and recites “a first vapor inputting structure is configured to deliver a first vapor flow and a second vapor inputting structure is configured to deliver a second vapor flow, wherein the first vapor flow and the second vapor flow are at the same time and a third vapor flow is sequential.” Berney’s “controller may be configured to cause an organometallic precursor and a corresponding counter-reactant to be simultaneously dispensed from their respective vaporizers 172 and through respective plenums of the showerhead 110 into the reaction space 120 for a given duration of time” as described in block 308 of Figure 3 below. Berney, ¶0064. A POSA would understand that the first vapor flow (i.e., flow of the organometallic precursor from its respective vaporizer) and the second vapor flow (i.e., flow of the counter-reactant from its respective vaporizer) are at the same time and form a sub-layer on the substrate. Berney also discloses “[a] second organometallic precursor (different from the first) may then be flowed across the substrate to create a second sub-layer.” Berney, ¶0066. Additionally, Berney’s apparatus for providing photoresist films includes “a controller having one or more processors...to a) cause...a first valve...to be actuated to cause a vapor-phase of a first organometallic precursor to be flowed...into the reaction space...and b) cause...a second valve...to be actuated to cause a vapor-phase of a first counter reactant to be flowed...into the reaction space...” <i>Id.</i>, 32:1-23. The apparatus also is capable of “controlling the one or more processors to: c) cause...a third valve...to be actuated to cause a vapor-phase of a second organometallic precursor to be flowed...into the reaction space...” <i>Id.</i>, 34:19-24. A POSA would understand that the first valve and the second valve represent the first and second vapor inputting structure, respectively. The apparatus further includes a “first vaporizer,” “second vaporizer,” and “third vaporizer, and located within each vaporizer is a quantity of “the first organometallic precursor,” “the first counter-reactant,” and “the second organometallic precursor,” respectively. Berney, 35:7-9. The apparatus can be used to “perform (a) and (b) to form a first sublayer on a substrate...and f) perform...(c)...to form a second sub-layer on top of the first sub-layer.” <i>Id.</i>, 35:15-18. Berney discloses “perform[ing] (a) and (b) simultaneously.” <i>Id.</i>, 34:12. A POSA would understand that first sub-layer would include the layer formed from the flow of the first vapor flow (i.e., “vapor-phase of a first organometallic precursor”) and the second vapor flow (i.e., “vapor-phase of a first counter reactant”) at the same time,

'048 Patent Claims	Disclosure of Prior Art
	and the second sub-layer would be formed after formation of the first sub-layer, and therefore the third vapor flow (i.e., “vapor-phase of a second organometallic precursor”) is sequential. Thus, a POSA would understand that Berney discloses a first vapor inputting structure (i.e., “first valve”) is configured to deliver a first vapor flow (i.e., “vapor-phase of a first organometallic precursor”) and a second vapor inputting structure (i.e., “second valve”) is configured to deliver a second vapor flow (i.e., “vapor-phase of a first counter reactant”), wherein the first vapor flow (i.e., “vapor-phase of a first organometallic precursor”) and the second vapor flow (i.e., “vapor-phase of a first counter reactant”) are at the same time (i.e., “cause an organometallic precursor and a corresponding counter-reactant to be simultaneously dispensed”; “perform[ing] (a) and (b) simultaneously”), and a third vapor flow (i.e., “vapor-phase of a second organometallic precursor”) is sequential (i.e., “stop the flow of the organometallic precursor and start the flow of the counter-reactant through the showerhead 110”; “alternate flows of organometallic precursor and counter-reactant”). A POSA would also understand that there are a limited number of obvious choices of continuous or alternating deliver methods, which would have been obvious-to-try.

'048 Patent Claims	Disclosure of Prior Art
	 Figure 3 Berney, Figure 3 (annotated).
Claim 18	

'048 Patent Claims	Disclosure of Prior Art
The system of claim 1 wherein the interior has a temperature from about 45° C. to about 200° C.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 18 depends on claim 1 and recites “the interior has a temperature from about 45° C. to about 200° C.” Berney discloses “maintain[ing] the temperature of the [chamber’s] interior wall surfaces...to between 80 °C and 120 °C.” <i>Id.</i>, ¶0062
Claim 19	
The system of claim 1 wherein X is alkylamido or dialkylamido.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 19 depends on claim 1 and recites “X is alkylamido or dialkylamido.” Berney discloses that L can be “a moiety that is an amine (such as a dialkylamino or monoalkylamino group).” Berney, ¶0023. A POSA would understand that Berney’s ligand L is analogous to X, and that Berney’s monoalkylamino and dialkylamino groups are alkylamino and dialkylamido groups, respectively. Berney also discloses tin precursors with dialkylamido groups of X: “where M is tin, such precursors include...i-propyltris(dimethylamino) tin...” <i>Id.</i>, ¶0024. A POSA would understand that dimethylamino is dialkylamido as defined in claim 1 (—NR₁R₂, where R₁ and R₂ are each methyl (hydrocarbon group with 1 carbon atom)).
Claim 20	
The system of claim 1 wherein X is alkoxo and aryloxo.	Berney, alone, in combination with the general knowledge of a person of ordinary skill in the art, and/or in combination with the other references identified, discloses and/or suggests this claim limitation. Claim 20 depends on claim 1 and recites “X is alkoxo and aryloxo.” Berney discloses that ligand L can be “an alkoxy group.” Berney ¶0023. A POSA would understand that ligand L of Berney is analogous to X, and the alkoxy groups of Berney are alkoxo groups. Berney also discloses specific examples of tin precursors with alkoxo groups of X: “where M is tin, such precursors include...alkyl(tris)(t-butoxy) tin compounds such as t-butyl tris(t-butoxy) tin₁₂.” Berney, ¶0024. A POSA would understand that t-butoxy is alkoxo as defined in claim 1 (—OR, where R is t-butyl (hydrocarbon group with 4 carbon atoms)).