Chris K. Haas, PhD

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Plastics and Materials Expertise

Technical Consulting, IP Support, Expert Witness

Collaborative engineer who uses customer-articulated insights to create novel, manufacturable solutions with project lead experiences ranging from early idea generation to launched products. Materials and composites expert with deep knowledge of polymers and adhesives who is also an enthusiastic educator with focus on development of products and team members. Specialist in security document features and failure mode analysis.

Areas of Expertise:

- **Polymer Processing, Extrusion, & Coating**
- **New Product & Technology Development**
- **Materials Engineering and Troubleshooting**
- **Security Document Printing and Fabrication**
- **Intellectual Property Generation & Maintenance**
- **Materials Failure Mode Analysis**
- **Polymer & Adhesive Systems & Properties**
- **Materials Manufacturing and Fabrication**

Professional Experience

INDIGO SCIENCES, LLC, Saint Paul, MN

Corporate Scientist/Consultant 2020 - Present

Provides technical and business support for materials-based systems, plastics processing, and security materials, including materials selection, physical testing/analysis, troubleshooting, and short courses. Consults on intellectual property generation and defense, including claim crafting and patent and infringement analysis and provides expert witness services (depositions, expert reports, etc.) in product liability and patent infringement cases.

3M, Maplewood, MN

3M Film and Material Science Division, Senior Manufacturing Technology Specialist 2021 - Present

Advancing 3M's sustainability drive by leading efforts in PFAS removal from water and waste and carbon reduction.

- Designed and implemented several large-scale water and soil treatment systems for manufacturing facilities.

Senior Product Development Specialist, Traffic Safety / Safety Security Division (SSD) 2004 - 2017

Led multiple top new product development projects through several different development phases, managing diverse international teams and 6 direct reports. Managed capital, lab, and manufacturing expenditure budgets.

- Engaged with dozens of external customers and stakeholders to elicit articulated and unarticulated needs and guided solutions as team lead by working with business and manufacturing organization to develop over 10 novel film and security products, resulting in more than $250M new product sales.
- Led more than 10 different teams with US and non-US personnel with marketing, manufacturing, and lab backgrounds with project phases ranging from early ideas to completed launched products.
- Invented and developed laserable extruded polycarbonate film and micro-optic laserable and color floating image technologies involving hands-on development, leading to over $30M in annual new product sales.
- Led design or was SME of multiple polycarbonate document manufacturing facilities.
- Developed many products involving polymer films, labels, and laminates.
- Supported multiple customers with credential and adhesive manufacturing optimization and troubleshooting.
- Developed processes involving extrusion, coextrusion, molding, forming, coating, curing, and vapor deposition.
- Served as sole technical member of SSD's IP management committee; 17 issued patents.

GEMALTO (Acquired by THALES), Oakdale, MN

Corporate Scientist, Physical Document Security R&D and Components Business 2017 - 2020

Performed several product support and development roles (quality, manuf., and R&D) for component solutions, including films, labels, and devices. Business development manager for $10M security labels business.

- Developed and launched 3 new-to-the-world security label products as sole development / manufacturing engineer with over $1M in new product sales using novel adhesive and film systems.
- Managed all acquired materials IP, including licensing aspects, office actions, and strategy. Filed 4 patents, 1 issued by December 2020. Licenses will generate $1M in revenue starting in 2021.

Univacco Exhibit 1003
Univacco v. Leonhard Kurz
Case PGR2006-00011

Prior role at 3M:
3M Corporate Research Process Laboratory, **Senior Process Development Engineer**
Led platform on polymer foaming, adhesives, blending, biodegradables, and supercritical fluid processing.
Supported several divisional programs with accumulated product sales of over $500M.

Academic Professional Experience

UNIVERSITY OF MINNESOTA, Minneapolis, MN 2021 - Present
Adjunct Assistant Professor, Department of Chemical Engineering and Materials Science
- Crafted and teaches courses in Engineering Materials and Junior ChE Lab.

UNIVERSITY OF SAINT THOMAS (UST), Saint Paul, MN 2009 - Present
Engineering Fellow, Mechanical Engineering Department
- Crafted and teaches courses in Materials Engineering, Fluid Mechanics Lab, Polymers in Design, Composites, and Thin Films.
- Guided over 35 year-long engineering projects in Senior Design with local medical device, manufacturing, start-up, and innovative design companies as project mentor and consultant.
- Active member of Engineering school which has grown from 24 to over 150 graduating seniors since 2009.

Education and Professional Development

- **Doctor of Philosophy (PhD)**, Chemical Engineering, Northwestern University, Evanston, IL 1997
  - Thesis Advisor: Prof. John Torkelson
  - Dissertation: "Coarsening in 2D and 3D Phase-Separated Polymer Solutions: Implications for Microporous Membrane Morphology"
- **Bachelor of Science (BS)**, Chemical Engineering, Northwestern University, Evanston, IL 1993
- **3M Programs:**
  - Six Sigma Green Belt and Advanced Leadership Development Program

Academic Outreach

- University of St. Thomas Core Curriculum Committee, 2018 - Present
- Co-Leader of Northwestern University (NU) Resource Team at 3M, 2003 - 2017
  - PhD recruiter, building team of over 12 PhDs
- 3M liaison to Canadian National Research Council, 2001 - 2003

Industry Involvement and Leadership Positions

- American Institute of Chemical Engineers (AIChE), Member
- NU Chemical and Biological Engineering Advisory Board, 2009 – 2023
- Document Security Alliance Program Committee member, 2020 – Present
- Document Security Alliance Security Features Working Group member, 2017 – 2020
- Optical Document Security Conference Organizing Committee, 2014 – 2019
- 3M Tech Forum Intellectual Property and Printing Chapter Steering Committees, 2010 – 2017
- AAMVA Mobile Driver's License Working Group, 2015 – 2017

19 Patents Issued and 2 articles published in Refereed Journals (see Addendum)

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Addendum

19 patents issued (main designations only)

- US 6468451, Method of Making a Fibrillated Article; Inventors: Perez, MA and Haas, CK; Oct 2002
- US 6645618, Aliphatic Polyester Microfibers, Microfibrillated Articles and Use Thereof; Inventors: Hobbs, TR, Soo, PP, Perez, MA, Haas, CK, and Kody, RS; Nov 2003
- US 6646019, Fibrillated Foam Article; Inventors: Perez, MA and Haas, CK; Nov 2003
- US 6692823, Microfibrillated Articles Comprising Hydrophillic Component; Inventors: Kody, RS, Perez, MA, Klun, TP, Graham, PD, Haas, CK, et al.; Feb 2004
- US 6890649, Aliphatic Polyester Microfibers, Microfibrillated Articles and Use Thereof; Inventors: Hobbs, TR, Soo, PP, Perez, MA, Haas, CK, and Kody, RS; May 2005
- US 7094463, Foam and Method of Making; Inventors: Haas, CK, Gehslen, MD, Mortenson, SB, Strobel, JM, Sura, RK, and Vall, DL; Aug 2006
- US 7655296, Ink-Receptive Foam Article; Inventors: Haas, CK, Taylor, RD, Black, WB, Jonza, JM, and Cooprider, TE; Feb 2010
- EP 1513690, Ink-Receptive Foam Article; Inventors: Haas, CK, Taylor, RD, Black, WB, Jonza, JM, and Cooprider, TE; Mar 2010
- US 7820282, Foam Security Substrate; Inventors: Haas, CK, Taylor, RD, Black, WB, Jonza, JM, Jennen, JM, Vall, DL, and Stumo, RJ; Oct 2010
- US 7883769, Integrally Foamed Microstructured Article; Inventors: Seth, J, Haas, CK, Sura, RK, Graham, KAS, Venne, JA; Feb 2008
- US 8003176, Ink Receptive Article; Inventors: Ylitalo, CM, Bacon, CA, Haas, CK, Jonza, JM, and Pellerite, J; Aug 2011
- US 8012550, Ink Receptive Article; Ylitalo, CM, Boyd, SA, Carls, JC, Carlson, EH, Haas, CK, Jonza, JM, Pellerite, J, and Watkins, RF; Aug 2011
- US 8496340, Retroreflective Articles and Retroreflective Elements Comprising a Spherical Core and Two Concentric Optical Interference Layers; Inventors: Budd, KD, Frey, MH, Haas, CK, and Krishnan, V; Jul 2013
- JP 5330407, Retroreflective Pavement Marking; Inventors: Budd, KD, Frey, MH, Haas, CK, and Krishnan, V; Oct 2013
- US 9289962, Laser-Personalized Security Articles; Inventors: Chen-Ho, K, Haas, CK, Dunn, DS, et al.; Mar 2016
- US 9340059, Static Dissipating Laser Engravable Film; Inventors: Haas, CK, Jaeger, PF, Lamanna, WM, Marszalek, GJ, and Garringer, K; May 2016
- US 10017001, Laser-Personalized Security Articles; Inventors: Chen-Ho, K, Haas, CK, Dunn, DS, Kong, SHC, Olson, DB, Larson, RA, and Potts, TL; Jul 2018
- US 10406845, Flexible Hinge Material Comprising Cross-Linked Polyurethane Material; Inventors: Rhyner, SJ, Haas, CK, Jones, TD, Chen-Ho, K, Hunt, KK, and Marx, RE; Sept 2019
- US 11186113, Integrated Floating Image for Security Documents; Inventors: Pohjola, T and Haas, CK; Feb 2021

Articles Published in Refereed Journals

1. C.K. Haas and J.M. Torkelson, Phys. Rev. E. **55**, 3191 (1997)
2. C.K. Haas and J.M. Torkelson, Phys. Rev. Lett. **75**, 3134 (1995)
3. T.G. Shepard, C. Haas and R. Menon, Proceedings of ASME 2017 Fluids Engineering Division Summer Meeting (2017), FEDSM2017-69211

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