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Chetali Gupta, Ph.D., P.E.

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Professional Profile

Dr. Gupta is a materials scientist with extensive knowledge and experience related to structure-property relationship of polymers used in industrial applications such as paints, coatings, adhesives and sealants. She leverages broad knowledge of chemical and physical behavior of polymers to support product development efforts from conceptualization through commercialization.

Dr. Gupta's current interests are automotive and architectural coatings, construction materials and composite structures.

Dr. Gupta specializes in rheological and mechanical characterization of paints, coatings and composite materials, and has applied this expertise to help clients resolve technical challenges and to design, engineer and formulate new products in the adhesives, automotive, industrial, architectural, personal care and construction industries. Dr. Gupta has also synthesized a number of polymeric materials used in industrial applications and is familiar with free radical and controlled (RAFT and ATRP) polymerization techniques.

Dr. Gupta has extensive experience with multiple characterization techniques used to probe the interactions between phases in complex suspensions, including surface techniques such as ellipsometry and microtensiometry. She has investigated properties of uncured suspensions and materials using static/dynamic light scattering and oscillatory rheology, and properties of cured materials using DMA, DSC, and TGA. Dr. Gupta is also proficient in the use of AFM, CT and XRD for the characterization of both ceramic and polymeric material, and in the use of microscopy techniques such as SEM and TEM for polymeric suspensions.

Prior to joining Exponent, Dr. Gupta worked as a research chemist at PPG Industries in the automotive adhesives, sealants and Noise/Vibration/Harshness (NVH) group in Pittsburgh, PA. During her time there, she helped formulate and characterize new coatings for several automotive customers. Before working at PPG, Dr. Gupta’s Ph.D. research focused on the grafting of polymers onto lignin, which improved the interfacial activity of lignin molecules, so they could be used as effective dispersants in high-solids suspensions and emulsions.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Carnegie Mellon University, 2017

M.S., Materials Science and Engineering, Carnegie Mellon University, 2015

B.S., Chemical Engineering, University of Maryland, College Park, 2013

QUEST Honors Program, Cohort 18, University of Maryland, College Park

Top Entrepreneurial Lead, NSF-ICorps, New York

Guest Speaker, American Society of Metallurgy, Young Members Night, February 2018

Licenses and Certifications

Professional Engineer Chemical, California, #7119

Red Cross - CPR/AED Certificate

NACE - Certified Coating Inspector Level 1 Certification

NACE - Certified Coating Inspector Level 2 Certification

Prior Experience

Research Chemist (Adhesives, Sealants and NVH Automotive OEM Coatings), PPG Industries, 2017-2018

Professional Affiliations

American Institute of Chemical Engineers – 2010 – Present

American Society of Metals – 2017 - Present

Languages

French (France)

Hindi

Patents

WO Patent 2016149638A1: Lignin-based surfactants, March 2015 (Washburn NR, Perkins KM, Gupta C)

Publications

Brooke, P., Bennett-Kennett, R., Gupta, C. et al. Failure of Coatings on Wood Substrates Due to Surface Preparation and Application. J Fail. Anal. and Preven. (2024). https://doi.org/10.1007/s11668-024-02090-7

Bennett-Kennett R, Gupta C, Guyer EP. Best Practices for Root Cause Analysis In The Context of a Potential Dispute. AMPP Eastern Conference, Grand Rapids, Michigan, 2024.

T. Shah, C. Gupta, R. L. Ferebee, M. R. Bockstaller, and N. R. Washburn, “Extraordinary toughening and strengthening effect in polymer nanocomposites using lignin-based fillers synthesized using ATRP,” Polymer, vol. 72, pp. 406–412, 2015.

C. Gupta and N. R. Washburn, “Polymer-grafted lignin surfactants prepared via reversible addition-fragmentation chain-transfer polymerization,” Langmuir, vol. 30, no. 31, pp. 9303–9312, 2014.

C. Gupta, M. J. Sverdlove, and N. R. Washburn, “Molecular architecture requirements for polymer-grafted lignin superplasticizers,” Soft Matter, vol. 11, pp. 1–9, 2015.L. R. Murray, C. Gupta, N. R. Washburn, and K. A. Erk, “Lignopolymers as viscosity-reducing additives in magnesium oxide suspensions,” J. Colloid Interface Sci., vol. 459, pp. 107–114, 2015.

K. S. Silmore, C. Gupta, and N. R. Washburn, “Tunable Pickering emulsions with polymer-grafted lignin nanoparticles (PGLNs),” J. Colloid Interface Sci., vol. 466, pp. 91–100, 2016.C. Gupta, E. Nadelman, K.E. Kurtis, N.R. Washburn, “Lignopolymer superplasticizers for alternative supplementary cementitious materials,”, International Conference on Grand Challenges in Construction Materials, vol.1, pp.1-10, 2016.

C. Gupta, K.M. Perkins, R. Rios and N.R. Washburn, “Poly(ethylene oxide)-grafted lignosulfonate superplasticizers: Improving performance by increasing steric interactions,” Adv. in Cement Research, vol. 29, pp. 2-10, 2017.

C. Gupta, E. Nadelman, N.R. Washburn and K.E. Kurtis, “Lignopolymer superplasticizers for low CO2 cements,” ACS Sustainable Chemistry and Engineering, vol. 5, pp. 4041-4049, 2017.

K. Perkins, C. Gupta and N.R. Washburn, “Surfactant properties of PEGylated lignins: Anomalous interfacial activities at low grafting density,” Colloids and Surfaces A: Physiochemical and Engineering Aspects, vol. 530, pp. 200-208, 2017.

A. Menon, C. Gupta and N.R. Washburn, “ Elucidating multi-physics interactions in suspensions for the design of polymeric dispersants: a hierarchical machine learning approach,” Molecular Systems Design and Engineering, vol. 2, pp. 263-273, 2017

J.D. Spencer, J.M. Moton, K. Gluesenkamp, A. McGahagan, M. Tesfaye, C. Gupta and V. Monje, "Design of a combined heat, hydrogen, and power plant from university campus waste streams." International Journal of Hydrogen Energy 38.12 (2013): 4889-4900.

Presentations

C. Gupta, K.T. Tan, M. Nakajima, D. Laird and M. French, “Effect of different rheology modifiers on the mechanical properties of epoxy based adhesive systems,” Adhesion Society Conference, San Diego, February 2018

C. Gupta, S. Kirby, S. Anna, L. Walker and N.R. Washburn; “Anomalous Interfacial Dynamics of Polymer-grafted Lignin Surfactants,” ACS Colloid and Surface Science Symposium, Pittsburgh, June 2015

C. Gupta and N.R. Washburn; “Molecular Architecture Requirements for Polymer-grafted Lignin Surfactants,” ACS Colloid and Surface Science Symposium, Pittsburgh, June 2015

C. Gupta and K. Rangan, “Synthesis and Characterization of Novel Silicon Carbide Fibers,” Materials Research Society, Boston, November 2012