Exponent®
Engineering & Scientific Consulting

Ishita Kamboj, Ph.D.

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Professional Profile

Dr. Kamboj is a materials scientist and engineer who specializes in the synthesis, electrochemistry, and characterization of energy storage materials. She has extensive experience designing and evaluating the performance of state-of-the-art lithium-ion battery materials, electrodes, and devices. Her work has focused on interrogating the relationships of electrode architecture and materials chemistry to battery performance using a suite of advanced characterization techniques. At Exponent, Dr. Kamboj leverages this background to support clients across the battery life cycle from design reviews, to performance and safety assessments, to failure analysis.

Before joining Exponent, Dr. Kamboj was an NSF Graduate Research Fellow at NC State University where she designed and characterized lithium-ion cathode materials and architectures. She advanced a low-temperature, aqueous synthesis method to create electrode architectures with tunable morphologies and geometries for structural batteries. During an internship at Argonne National Lab, Dr. Kamboj also studied the influence of transition metal composition on the performance of low cost, earth-abundant Li- and Mn-rich cathodes. She has experience with a variety of techniques ranging from materials synthesis (hydrothermal, electrodeposition, solid-state), characterization (SEM, EDS, XRD, X-ray CT, ICP, TGA, in-situ and operando Raman microscopy) and electrochemical analysis (GCD, CV, GITT, entropymetry).

As a former Mirzayan Fellow at the National Academies of Sciences, Dr. Kamboj also supported convenings and studies on plastics, carbon management, municipal solid waste, circular economy, and forever chemical pollution. Prior to her graduate studies, she assessed hermetic welding techniques for medical device batteries at Medtronic and synthesized and characterized vibration-damping adhesives at 3M.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, North Carolina State University, 2024

Masters, Materials Science and Engineering, North Carolina State University, 2022

Bachelors, Materials Science and Engineering, University of Minnesota, Twin Cities, 2019

Christine Mirzayan Science & Technology Policy Fellowship, National Academies of Sciences, Engineering, & Medicine, 2024

National Science Foundation Graduate Research Fellowship, 2021-2024

Climate Leadership Scholar, Kenan Institute for Engineering, Technology, & Science, 2022-2023

Prior Experience

Science & Technology Policy Fellow, National Academies of Sciences, Engineering, & Medicine, 2024

Graduate Researcher, NC State University, 2019-2024

Visiting Student Researcher, Argonne National Laboratory, 2022-2023

Process Development Engineer, Medtronic Energy & Component Center, 2019

Technical Aide, 3M, 2016-2018

Publications

Kamboj, I., Moon, S., Teeters, H., and Augustyn, V. (2025) Competition between dissolution and ion exchange during low temperature synthesis of LiCoO2 on porous carbon scaffolds. Journal of Materials Chemistry A. https://doi.org/10.1039/D4TA09258A

Vidal Bustamante, C., Hernandez, V., Kamboj, I., Datta, A. and Taylor, J. (2024) Policy Priorities to Build and Sustain the U.S. Semiconductor Manufacturing Workforce. Journal of Science Policy & Governance, 25 (1). https://doi.org/10.38126/JSPG250116

Kabra, V., Birn, B., Kamboj, I., Augustyn, V. and Mukherjee, P.P. (2022) Mesoscale Machine Learning Analytics for Electrode Property Estimation. The Journal of Physical Chemistry C, 126 (34), 14413-14429. https://doi.org/10.1021/acs.jpcc.2c04432

Das, B., Batley, J.T., Krycka, K.L., Borchers, J.A., Quarterman, P. Korostynski, C., Nguyen, M., Kamboj, I., Aydil, E.S., and Leighton, C. (2022) Chemically Induced Magnetic Dead Shells in Superparamagnetic Ni Nanoparticles Deduced from Polarized Small-Angle Neutron Scattering. ACS Applied Materials & Interfaces,14 (29), 33491-33504. https://doi.org/10.1021/acsami.2c05558

Fleishmann, S., Kamboj, I., and Augustyn, V. (2022) Nanostructured Transition Metal Oxides for Electrochemical Energy Storage. In J. Nanda and V. Augustyn Transition Metal Oxides for Electrochemical Energy Storage (pp. 183-212) Wiley. https://doi.org/10.1002/9783527817252.ch8

Spencer, M.A., Yildiz, O., Kamboj, I., Bradford, P.D., and Augustyn, V. (2021) Toward Deterministic 3D Energy Storage Electrode Architectures via Electrodeposition of Molybdenum Oxide onto CNT Foams. Energy & Fuels, 35 (19), 16183–16193. https://doi.org/10.1021/acs.energyfuels.1c02352

Hsain, H. A., Tam, R., Kamboj, I., & Dudek, R. (2020). Paid Family Leave to Strengthen the STEM Workforce Journal of Science Policy & Governance, 17(2). https://doi.org/10.38126/JSPG170207

Batley, J. T., Nguyen, M., Kamboj, I., Korostynski, C., Aydil, E. S., & Leighton, C. (2020). Quantitative Understanding of Superparamagnetic Blocking in Thoroughly Characterized Ni Nanoparticle Assemblies. Chemistry of Materials, 32(15), 6494–6506. https://doi.org/10.1021/acs.chemmater.0c01758

Presentations

Kamboj, I. and Maithya, G. (2024) A case study for implementing low-cost microgrid technology in rural Sub-Saharan Africa using earth-abundant energy storage. 12th International Conference of the African Materials Research Society. Kigali, Rwanda. Oral Presentation.

Kamboj, I., Moon, S., Teeters, H., and Augustyn, V. (2023) Deterministic Design of Energy Storage Electrodes through Oxide Electrodeposition on Carbon-based Scaffolds. Joint Undertaking for an African Materials Institute (JUAMI) Workshop. Nairobi, Kenya. Poster Presentation.

Kamboj, I., Spencer, M.A., Kabra, V., Vishnugopi, B.S., Hossain, M.M., Mukherjee, P.P., Bradford, P.D., & Augustyn, V. (2022) Design Strategies for Lithium-ion Battery Cathode Materials and Architectures. Batteries Gordon Research Conference & Seminar. Ventura, CA. Oral Presentation & Poster.

Kamboj, I., Spencer, M.A., Yildiz, O., Bradford, P.D., & Augustyn, V. (2020) Deterministic Design of Energy Storage Electrodes through Oxide Electrodeposition on CNT Foam Scaffolds. Materials Research Society Annual Meeting. Oral Presentation.