TITLE**: Addressing the Dendrite Challenge in Lithium and Potassium Metal Batteries**

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ABSTRACT
Nucleation and growth of dendritic structures on the metal anode, is the primary barrier to realization of high performance alkali-metal batteries. In this talk, I will show that the metal dendrite problem can be addressed by using self (Joule) heating to accelerate surface diffusion processes to heal (smoothen) the dendrites in situ. Results will be shown for lithium as well as potassium metal chemistries. Such advances show potential in enabling the successfully deployment of lithium and potassium metal batteries with breakthrough improvements in performance, cost and safety.

RELATED PUBLICATIONS:

(1) L. Li, S. Basu, Y. Wang, Z. Chen, P. Hundekar, B. Wang, J. Shi, Y. Shi, S. Narayanan, N. Koratkar, “Self-heating–induced healing of lithium dendrites”, Science 359, 1513-1516 (2018).

(2) P. Hundekar, S. Basu, X. Fan, L. Li, A. Yoshimura, T. Gupta, V. Sarbada, A. Lakhnot, R. Jain, S. Narayanan, Y. Shi, C. Wang, N. Koratkar, "In Situ Healing of Dendrites in a Potassium Metal Battery",
Proceedings of the USA National Academy of Sciences (PNAS) 117, 5588-5594 (2020).

BIO:

Nikhil Koratkar is the John A. Clark and Edward T. Crossan Chair Professor at the Rensselaer Polytechnic Institute (RPI). His research has focused on the synthesis, characterization and application of advanced materials. Professor Koratkar is a winner of the NSF CAREER Award (2003), RPI James M. Tien '66 Early Career Award (2005), the Electrochemical Society's SES Young investigator Award (2009), American Society of Mechanical Engineering (ASME) Gustus L. Larson Memorial Award (2015), IIT-Bombay Distinguished Alumnus Award (2019) and the RPI William H. Wiley 1866 Distinguished Faculty Award (2021). In 2016, Koratkar was elected a Fellow of the ASME. He has published a book on graphene as an additive in composite materials and over 200 archival journal papers. In 2018, Clarivate Analytics named him in their highly cited researchers list (top 1% by citations). Koratkar serves as an Editor of CARBON (Elsevier). He also serves on the advisory board of a start-up company aimed at commercializing next-generation energy storage solutions.