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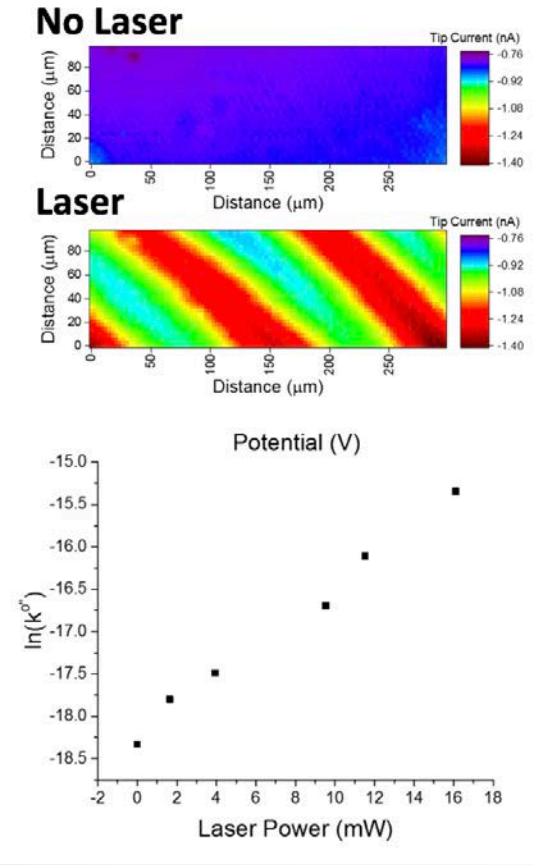
Modulating the local reactivity of 2D electrodes via photothermal effects using nanoparticle sublayers

R. Bhargava, J. Rodriguez-Lopez
University of Illinois Urbana-Champaign

Atomically-thin electrochemical interfaces, such as graphene, create new opportunities to modulate reactivity in 2D electrodes by means of light and materials interactions at the nanoscale.

In the search for reactive and spectroscopic enhancements at graphene/metal interfaces, the I-MRSEC Seed identified a new way to modulate electrocatalytic reactivity using photothermal effects. Au nanoparticles placed below a sheet of graphene induced thermal gradients at the electrochemical interface. These effect created large differences in the local electrochemical reactivity – enhancing currents and modifying the mechanisms for the oxygen reduction reaction (ORR) – a key component for renewable technologies. Reproducible enhancements, and a new way to observe them using scanning electrochemical microscopy will pave the way to exploring new concepts in the control of 2D interfacial reactivity.



Electrochemical imaging of reactive enhancements on patterned Au/Graphene electrodes and quantification of kinetic effects on the ORR

Schorr, N.B. et al. In preparation.

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