Electrochemically Generated Nanobubbles

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Gas evolving reactions are ubiquitous in the operation of electrochemical devices, and can result in the formation of bubbles that block the electrode and decrease reaction rates. The deleterious effect of bubbles is amplified by the current trend of miniaturization of electrodes to nanoscopic sizes, as a single nanobubble can grow to cover the whole reactive area. This presentation will discuss our work using molecular simulations and theory to understand the electrochemical formation an stationary states of bubbles on nanoelectrodes, how the size and shape of the electrodes impact the currents that can be obtained when a bubble forms, and how we can use that knowledge to maximize conversion rates on gas producing electrochemical reactions.[1-4]

REFERENCES

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FIGURES

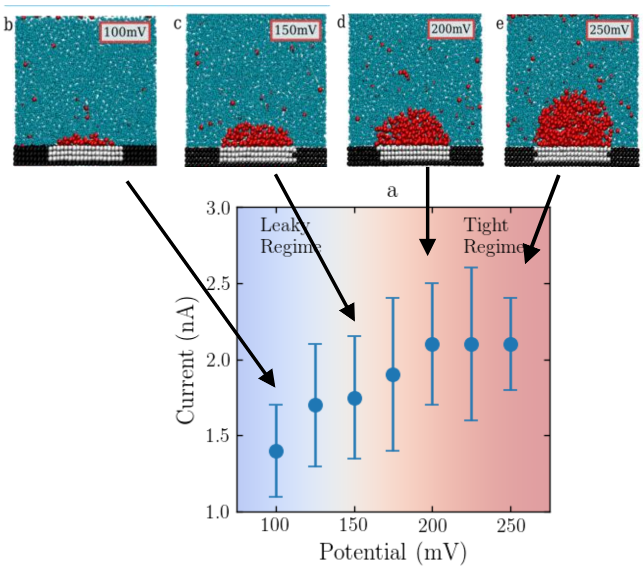

Figure 1: The stationary current of the electrode with a pinned nanobubble has two regimes. The current increases with applied potential at low overpotentials ("leaky" regime) and is constant at large overpotentials ("tight" regime). The size of the stationary bubbles increases monotonously with potential along these two regimes.