# Investigation of Superlattices and Nanostructures Formed by Electrochemical Atomic Layer Epitaxy

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Electrochemical atomic layer epitaxy (EC-ALE) is an approach to form thin layers of semiconductors. Being an electrochemical process that relies on underpotential deposition, it has a number of advantages, as compared to alternative techniques such as MBE.

During EC-ALE a compound semiconductor film is formed by alternating, layer by layer deposition of each semiconductor element. Thus, EC-ALE provides deposition control at the atomic level, and being a room temperature technique, interdiffusion between layers can be neglected. Combined, these advantages allow the deposition of high quality heterostructures, or the introduction of a true single atomic dopant layer (delta doping).

Being an electrochemical process, deposition (obviously) occurs on the electrode only. Thus, a structured electrode will result in structured deposits. Structuring the electrode on the nm scale will result in the deposition of nanostructured semiconductors, such as quantum dots or nanowires.

EC-ALE is rapidly developing into a mature technology that is well recognized within the electrochemical community. However, only little is known about the potential of this technique among physicists, who, once introduced to EC-ALE, are almost always fascinated by the vast opportunities this technique offers with respect to material engineering on both the micro- and nano-scale. To convey a flavor of this fascination, an overview of recent results at UGA on nanostructured EC-ALE deposits will be given from a physicist's point of view.

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