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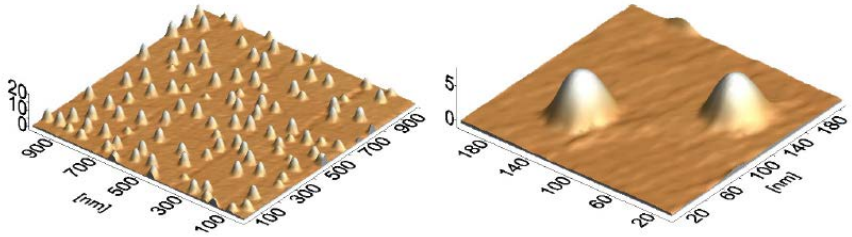
Specialization /Master project:

Laplace DLTS on self-assembled quantum dot double layers

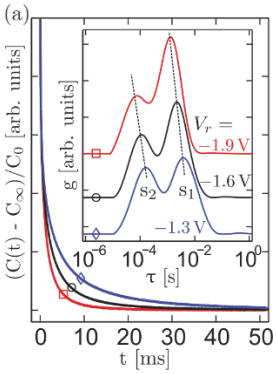
Contact: T. Heinzel (thomas.heinzel@hhu.de)

Start: October 2019 or later

Laplace deep level transient spectroscopy (Laplace DLTS) is a powerful new method to study the properties of self-assembled quantum dots (SAQDs) with large separations from conductive electrodes. One advantage of this method is that conceptually, individual layers in multilayer SAQD samples can be accessed individually. Within this thesis, we plan to study whether this concept can be implemented using the most elementary case, namely a SAQD double layer with an optimized design.



Scanning probe microscope picture of a self-assembled quantum dot layer. Adapted from O. Wibbelhoff, PhD thesis, Duisburg (2006).



Typical capacitance transients as obtained from the emission of electrons from SAQDs. The inset shows the measured distributions of the emission life times for different electric fields. From L. Schnorr et al. J. Apl. Phys. ***124****, 104301 (2018).*

Within the specialization module, you will learn how Laplace deep level transient spectroscopy works using an established sample and setup. Also, we will study the properties of self-assembled quantum dots within a literature review. The Master thesis itself will be focused on measurements on the double layer structure with the goal to study the two SAQD layers independently as well as their mutual influence.

Prof. Dr. Th. Heinzel