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Surface tension of Au-catalysed GaAs nanowires

Andersen CR^{1,2,3}, Tornberg M^{2,3,4}, Jacobsson D^{2,3}, Dick K A^{2,3,4} and Mølhave K¹

¹. National Centre for Nano Fabrication and Characterization, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark

². nCHREM and Centre for Analysis and Synthesis, Lund University, 22100 Lund, Sweden

³. NanoLund, Lund University, 22100 Lund, Sweden

⁴. Solid State Physics, Lund University, 22100 Lund, Sweden

Contact: chrisan@dtu.dk

Liquid droplets hold together by the surface tension, which is the force that makes the surface molecules attract each other. It is not only the phenomenon explaining droplet formation, but it is also an important factor, when studying vapor liquid solid growth, which is a common used growth mechanism for nanowires [1]. Today however, growth models and predictions are based on approximate values of the surface energy lacking in reports of empirical values [2].

Surface tension of the AuSi eutectic on silicon nanowires has previously been reported [3]. Here, we use a similar procedure growing Au-catalyzed GaAs nanowires on microfabricated Si-cantilevers deforming the catalyst in an arsine atmosphere using a unique ETEM with a purpose built gas handling [4]. Image analysis and 3D simulations (Fig. 1a) using COMSOL Multiphysics are used to compare the aspect ratio of the droplet at various fields and temperatures (Fig. 1b) reporting an empirical value of the surface tension for the first time.

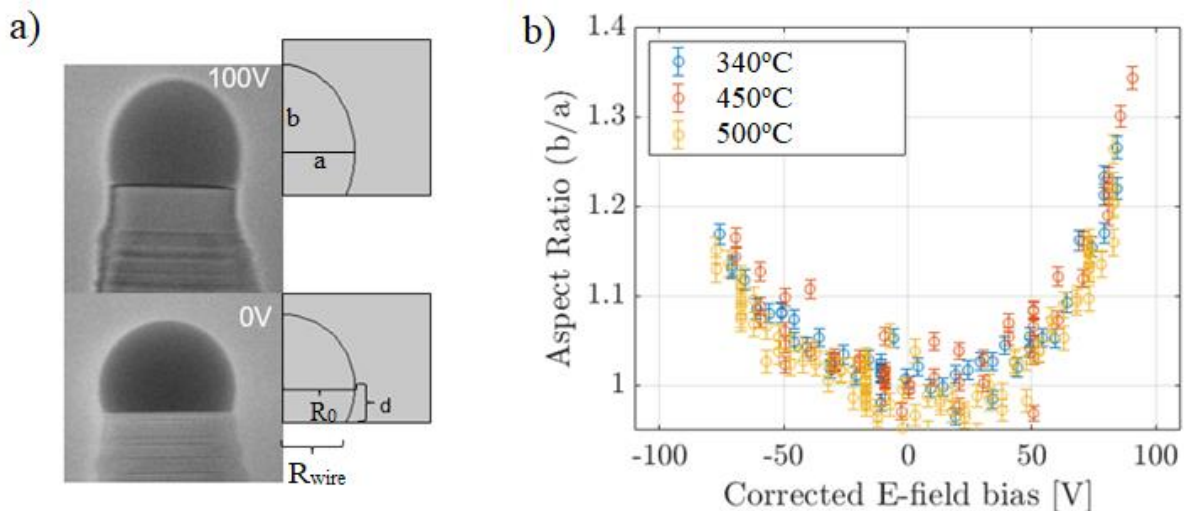


Figure 1 Images of droplet deformations and corresponding simulations (a) with and without an electric field applied and aspect ratio at three different temperatures and various fields (b) found from image analysis.

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