
S E M I N A R **aus** **Halbleiterphysik und Nanotechnologie**

Mo, 21.06.2021, 14:15 Uhr, (Seminar via Zoom)

“Electromechanical manipulation and characterization of materials via scanning probe microscopy”

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In this talk, I will review some studies carried out at the LabNano–UFMG (Brazil) where we use scanning probe microscopy (SPM) beyond conventional morphological characterization of materials. More specifically, we explore the possibility of mechanical and/or electrical manipulation of materials provided by the SPM tip to actively modify, characterize and even create different materials at the nanoscale. Starting with carbon nanomaterials (nanotubes and graphene) and then extending to other 2D materials (h-BN, MoS₂ and others), I will show several examples of electromechanical nanomanipulation of materials, such as the deformation-induced metallic transition in carbon nanotubes and the creation of a 2D diamond material via compression of graphene. I will also present some purely electrical and mechanical characterization/manipulation studies, such as the charge transfer mechanisms between neighboring carbon nanotubes and the observation of a negative dynamic compressibility in 2D materials. These SPM-based studies encompass from technical results, such as the determination of the metallic/semiconducting character of carbon nanotubes, to fundamental science, such as the observation of universal mechanical deformation pathways in nanotubes and in 2D material wrinkles. In summary, this talk intends to illustrate the idea that SPM is more than just a “giant magnifier for the nanoworld” as it offers the rare possibility of simultaneously modifying and characterizing these modifications at the nanoscale