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"A close look to the atoms: a journey to the nanoworld through advanced electron microscopy"

Prof. Jordi Arbiol

ICREA & Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and The Barcelona Institute of Science and Technology (BIST), Campus UAB, Bellaterra, 08193 Barcelona, Catalonia, Spain

New materials for future applications are nowadays being synthesized at nanoscale (ultrathin interfaces, nanoparticles, nanowires and quantum structures, all functionalized for novel applications). As developments in Materials Science are pushing to the size limits of physics and chemistry, there is a critical requirement for identifying and manipulating the atoms at the nanoscale. There is a serious need in advanced nanomaterials to determine their structure, composition and morphology at atomic scale in order to correlate these results with the physical and chemical properties and functionalities they have. In this way, a worldwide increasing interest for advanced electron micro/nanoscopy is emerging. Imagine being able to hold an electron beam over a single atom for 1 entire second in order to actually directly SEE and acquire information. The advent of aberration-corrected transmission electron microscopy technology is now giving resolutions below 0.05 nanometers enabling single atoms to be directly viewed and nano and quantum structures to be optically and electrically analyzed in-situ. We will be able to see single atoms and fancy nanostructures, and we will explain how simple changes at atomic scale can make a great difference when looking at the material properties from the macroworld (photonics and electronics). There is a way to paint the nanoworld with colors, obtaining the intrinsic properties of the atoms themselves, while 3D atomic models obtained from accurate structural analyses will help to understand the growth mechanisms at the nanoscale.