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Transmission Electron Microscopy of Interface Phenomena in Functional Nanomaterials

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High-resolution imaging and spectroscopic techniques of advanced transmission electron microscopy (TEM) play a crucial role in characterizing the structure-property relationships of inorganic functional materials and interfaces. Three areas illustrating the superior potential of these methods will be adressed:

(i) Quantitative precision analyses by aberration-corrected high-resolution TEM of growth and interface phenomena for a $(PbS)_{1.14}NbS_2$ chalcogenide misfit compound with incommensurate interfaces; [1,2]

(ii) Microstructure analyses of growth and doping phenomena by TEM and by scanning (S)TEM in combination with energy-dispersive X-ray spectroscopy of ZnO [3] and In_2O_3 [4] semiconductor nanowires and *in situ* TEM studies of melting phenomena of metallic cores in ZnO nanotubes [5];

(iii) Applications of imaging and spectroscopic methods of TEM and STEM in developing novel concepts for fabricating multi-junction III-V semiconductor solar cells on Ge cells and on Si cells [6-9] that are used in concentrator photovoltaics.

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