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d*I*/d*V* Imaging of Some Complex Nanostructures vis-à-vis Heterojunction Solar Cells

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Scanning tunneling spectroscopy (STS) or d*I*/d*V* spectrum has become an important experimental method to study density of states (DOS) of semiconductor nanostructures. The localized nature of the spectroscopy yields density of electrons at the point of measurement as a function of energy. That is, d*I*/d*V* spectrum allows derivation of the energy levels at that particular point of a nanostructure. Band-diagram of a range of heterostructures can therefore be constructed through this technique.

The STS in addition allows one to "see" the materials selectively through d*I*/d*V* imaging. A d*I*/d*V* image has a correspondence to the materials' DOS. Such a nature of imaging hence implied energy-mapping of complex nanostructures due to dissimilar DOS intensity of the constituent materials at the voltage of imaging. d*I*/d*V* images of complex nanostructures like *pn*-junction nanorods or heterodimers shoot at different voltages allowed us to view *p*- and *n*-sections of heterojunctions separately and more importantly the depletion region in such a junction that has a type-II band-alignment, which is necessary in solar cells.

We will discuss formation of band-diagrams in some heterojunctions for solar cell applications.