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Nanoimprint & nanolithography, Organ/inorganic Heterojunction Solar Cells, Nanoscale Thermal Transport

Our primary research interests include the following three major parts: **(a) Nanoimprint & Nanolithography :** We have developed techniques to fabricate nanostructured anti-reflection layer on Si solar cells using a homemade nanoimprintor. Power conversion efficiency of the cells was improved as much as 3 percent points with nanostructured ARC. (Figure 1). **(b) Organic/inorganic Heterojunction Solar Cells:** Power conversion efficiencies exceed 13% were achieved for PEDOT:PSS/Si and PEDOT:PSS/GaAs solar cells fabricated using spin-coating at low temperature. (Figure 2&3). **(c) Nanoscale Thermal Thansport in Single Nanowires:** In order to measure the thermal conductivity of single nanowires and nanowire bundles, micro-devices consisted of two adjacent suspended silicon nitride membranes were fabricated. single Sb_2Se_3 and P3HT nanowires were carefully placed on the device to bridge the two membranes. By accurately determining the relationship of temperature difference on each heating/sensing suspension membranes with the joule heating, we successfully deduced a thermal conductivity value for single nanowires (Figure 4).

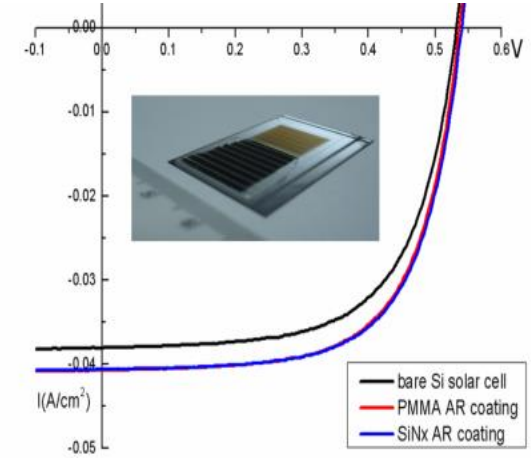

Figure 1

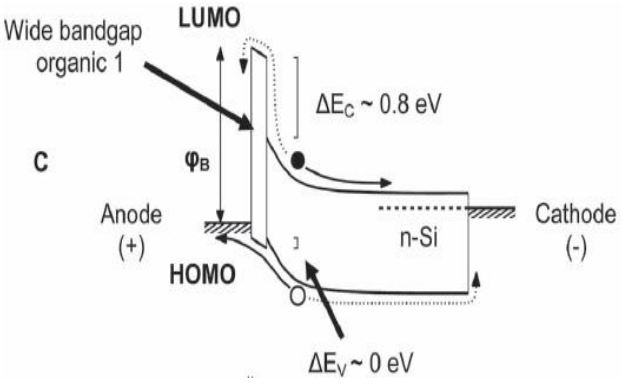

Figure 2

Figure 3

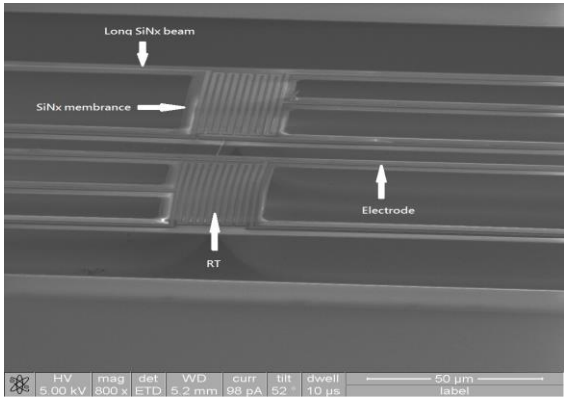

Figure 4