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Mechanical Properties of CdSe Tetrapods LIANG FANG, MIQUEL SALMERON, Lawrence Berkeley Lab — CdSe tetrapods are novel nanoscale crystals with unique electric/optical properties, which makes them promising candidates for making nanocrystal based photovoltaic solar cells. However, their mechanical properties are still not well understood. We used atomic force microscopy to study their mechanical and electrical properties and try to discover the correlation between them. First of all, the AC mode images revealed that each arm of the tetrapods is about 150 nm long except the one that is along the surface normal (the vertical arm). They also showed that the tetrapods deposited on Si surfaces have already been pushed down by the capillary force caused by surface water layer. Additionally, the mechanical properties of CdSe Tetrapods were studied using force-volume technique. We were able to put the AFM tip right on the top of the vertical arm using this technique. We discovered that the tetrapods would undergo elastic deformation if the applied force was less than 52 nN. After we applied force more than 91 nN, the tetrapods would undergo plastic deformation and we started to observe the bending of the vertical arm. Applying a force more than 130 nN on top of the vertical arm would then completely destroy the tetrapods. Current Force Microscopy will be used to study the mechanical and electrical properties of tetrapods at the same time, which will be expected to give us more insight on the relationship between the electrical properties of CdSe tetrapods and their "molecular" structures.

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