

Low temperature growth and characterization of CdTe quantum dots and thin films

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This work reports on the growth of cadmium telluride ultra films and quantum dots using the hot wall epitaxy technique. The thin films were grown on glass and Silicon substrates, while the quantum dots were grown on BaF₂ and Silicon. The growth technique allows the use of very low growth temperatures, down to 150 °C at growth rates between 0.02 to 100 Å/s. The samples were characterized by perfilometry, atomic force microscopy, x-ray diffraction and optical transmission. The films grown on glass substrates revealed a high degree of preferential (111) orientation and very good optical quality. The perfilometry showed that the growth temperature can be used as a parameter to control surface roughness. The use of very low growth temperatures opens the possibility to grow these samples on polymer substrates and therefore the fabrication of hybrid semiconductor/polymer solar cells. The atomic force images showed that the quantum dots grow under the Vomer-Weber growth mode and that the growth temperature can control the size distribution and dot density. X-ray diffraction revealed that the dots grow epitaxially and completely relaxed.

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