

Room Temperature Coulomb Blockade in an Electrochemically Synthesized Semiconductor Quantum Dot Array

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We have fabricated cylindrical CdS quantum dots by electrodepositing CdS in the pores of an anodized alumite film. The anodization was carried out in sulfuric acid which results in the formation of 10-nm diameter pores. The CdS dots thus have a diameter of 10 nm and heights of about 30 nm.

In order to prepare samples for transport measurement, we removed the alumina barrier layer by dissolution in NaOH. Gold was then evaporated on one side and the other side was contacted by silver paint.

Current voltage characteristics were measured at room temperature and shows a blockade region of 0.03 V asymmetrically straggling the origin. The effective capacitance estimated from this measurement is 5.4 aF. This is of the same order of magnitude that was estimated from independent capacitance measurements.

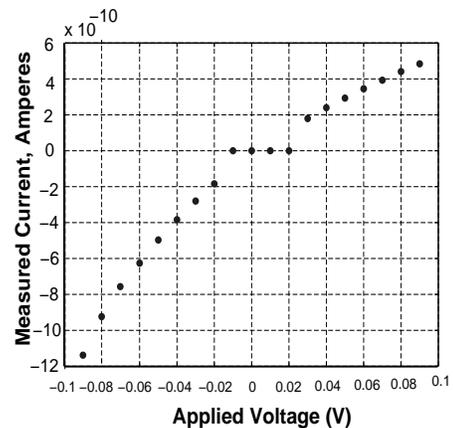


Figure 1: Room temperature current voltage characteristic of CdS quantum dots.

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