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Very high Kondo temperature ($T_K \sim$ 80 K) in single self-assembled InAs quantum dots coupled to metallic nanogap electrodes[1]

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— We have studied electron tunneling through single self-assembled InAs quantum dots (QDs) laterally coupled to metallic nanogap electrodes. Lateral electron tunneling structures were fabricated by forming nanogap metallic electrodes directly upon single self-assembled InAs QDs grown on GaAs surfaces. The n-type substrate was used as a backgate electrode. Although no intentional tunneling barriers were introduced, the fabricated samples worked as single electron transistors and exhibited Coulomb blockade effect. Furthermore, a clear spin-half Kondo effect was observed when strong coupling between the electrodes and the QDs was realized using a large QD with a diameter of ∼100 nm. From the temperature dependence of the linear conductance at the Kondo valley, the Kondo temperature, T_K, was determined to be $\sim$ 81 K. This is the highest T_K ever reported for artificial semiconductor nanostructures. This high Kondo temperature is due to strong QD-electrode coupling and large charging/orbital-quantization energies in our self-assembled InAs QD structures.

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