Capture and release of carriers in InGaAs/GaAs quantum dots.

We observe the ultrafast capture and release of charge carriers in InGaAs/GaAs quantum dots (QDs) at room-temperature with time-resolved terahertz spectroscopy. For excitation into the barrier states, a decay of the photoinduced conductivity, due to capture of carriers into the nonconducting QD states is observed. The increase of the decay time constant with increasing pump fluence is attributed to filling of the QD states. In the case of resonantly excitation into the QD ground state a maximum conductivity is reached 35 ps after photoexcitation, which is assigned to the release of carriers from the QDs into the wetting layer and barrier states.

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