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Electron relaxation in quantum dot and quantum well systems by the ICD mechanism NIMROD MOISEYEV, Schulich faculty of Chemistry and Faculty of Physics, Technion-Israel Institute of Technology — Electron relaxation in quantum dot (QD) and quantum well (QW) systems has a significant impact on QD and QW optoelectronic devices such as lasers, photodetectors, and solar cells. Several different fundamental relaxation mechanisms are known. We focus here on inter-coulombic decay (ICD) mechanism. In 2011 we have shown that the electron relaxation in a quantum dot dimer due to the ICD mechanism is on a picoseconds timescale (PRB **83**, 113303) and therefore IR QD detectors based on ICD seems to be feasible. Here we discuss the possibility to observe electron relaxation in QWs. In QWs the effective mass of the electron is not continuous, and can affect the lifetime of the ICD process. In order for the ICD to be the dominant decay mechanism, it must prevail over all other possible competitive decay processes. We have found in our setup that the ICD lifetime is on the timescale of picoseconds. An enhancement of the ICD process occurs when the ionized electron temporarily trapped in a shape-type resonance in the continuum. An experiment based on our findings is currently in progress. In this talk another possibility to observe the ICD phenomenon in two coupled QWs is proposed, by transferring an electron through a two coupled quantum wells structure populated by only one electron. An enhancement in the electron transmission would be obtained when the energy of the incoming electrons allows them to be temporarily trapped inside one of the two quantum wells via the ICD mechanism.

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