

## HL 29: Invited Talk: A. Marent

Time: Tuesday 14:45–15:15

Location: H17

**Invited Talk**

HL 29.1 Tue 14:45 H17

**Quantum Dot Flash Memories: The best of two worlds** —

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DRAM and Flash memories dominate presently the semiconductor memory market. DRAMs provide fast access times ( $>10$  ns) but the information has to be refreshed every ten milliseconds. Flash memories are non-volatile with storage times of  $>10$  years, but exhibit a slow write speed. Self-organized quantum dots (QDs) might provide a basis for new generations of memories. They can store just a few charge carriers with a retention time depending on the material combination. Furthermore, the carrier relaxation process into QDs is on the order of

sub-picoseconds, an important prerequisite for a very fast write time in such memories.

We developed a memory concept based on QDs, which combines the best of DRAM and Flash and enables ultra fast write times ( $<ns$ ) in combination with a long storage time ( $>>10$  years). We already demonstrated a write time in a QD based memory structure of 6 ns and a hole storage time of 1.6 seconds at room temperature. In addition, we predict a storage time of much more than 10 years using 8-band  $k^*p$  theory. First prototypes of the QD-Memory with full functionality using InAs-QDs were designed and processed. The performance of the prototypes has been evaluated up to 200 K. This work is partly funded by the DFG, BI 284/29-1 and in the framework of the NanoSci-E+ project QD2D of the European Commission.