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# MOVPE droplets heteroepitaxial growth model

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## Abstract

There is an increasing interest in Quantum Dot (QD) structures for various applications, including optoelectronic devices, quantum information processing and energy harvesting. Over the last years, self assembled QD's, prepared by different methods have been observed in different semiconductor systems. In the present research we grow the dots using the Droplet Hetero Epitaxial (DHE) mode. This method is potentially not limited to mismatched material systems as in other growth methods and is very attractive for the growth of binary and more complicated compounds. Although the DHE method is relatively complex, it is quite relaxed with respect to the material combinations that can be used. This offers great flexibility in the systems that can be achieved. In this work we review the structure and composition of a number of quantum dot systems grown by the droplet heteroepitaxy method, emphasizing the insights that these experiments provide with respect to the growth process.

Detailed structural and composition information with sub-nano resolution has been obtained using both conventional nano characterization methods with surface X-ray diffraction analyzed by the COBRA phase retrieval method. A number of interesting phenomena have been observed: These include penetration of the dots into the substrate ("nano-drilling"); interdiffusion and intermixing that already start when the group III droplets are deposited. The final dots structure and composition may be very different from the one initially intended. The recent understanding of the DHE growth dynamics can open a way to tune the confinement potential, electrical and optical properties of the final nano-structures.

## Biography

Yossi Paltiel has completed his PhD. in the Physics department at the Weizmann Institute of Science, Rehovot Israel. Following his PhD he served as the head of the electro optical division in several startups. He had also a tenured position at Soreq national laboratory Israel working on Semiconductors quantum devices. Since July 2009, he is leading the Applied Physics Department Quantum Nano Engineering group at the Hebrew University, and received a tenured position January 2013. YP have published more than 60 papers and have 9 patents and patent applications. Since 2009 the group gave 22 invited talks.