"Self-Assembled Quantum Dots for Optoelectronic Devices: Progress and Challenges"

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Low dimensional structures (LDS) form a major new branch of physics research. They are semiconductor structures, which have such a small scale in one or two spatial dimensions that their electronic properties are significantly different from the same material in bulk form. These properties are changed by quantum effects. Throughout the world there is increasing interest in the preparation, study and application of LDS. Their investigation has revitalised condensed matter science, in particular semiconductor materials. These complex LDS offer device engineers new design opportunities for tailor-made new generation electronic and photonic devices. New crystal growth techniques such as molecular beam epitaxy (MBE) and metal-organic chemical vapour (MOCVD) deposition have made it possible to produce such LDS in practice. These sophisticated technologies for the growth of high quality epitaxial layers of compound semiconductor materials on single crystal semiconductor substrates are becoming increasingly important for the development of the semiconductor electronics industry.

One of the main directions of contemporary semiconductor physics is the production and study of structures with a dimension less than two: quantum wires and quantum dots, in order to realize novel devices that make use of low-dimensional confinement effects. During the last few years much attention has been devoted to the strain in the grown layer and characterization of self-assembled semiconductor quantum dots (QDs). The strong interest in these semiconductor nanostructures is motivated by the possibility to use them as active media in future high-speed electronic and photonic devices. This talk is intended to convey the flavour of the subject by focussing on the technology and applications of self-assembled quantum dots.