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HRTEM of Quantum Dot Nanostructures: The First 15 Years S. ROUVIMOV, Nano-Crystallography Group, Portland State University, Portland, OR 97207-0751, USA, N.N. LEDENTSOV, Ioffe Physico-Technical Institute, Politechniczeskaya 26, 194021, St-Petersburg, Russia; TU Berlin, PN5-2, Hardenbergst 36, D10623, Berlin, Germany, P. MOECK, Nano-Crystallography Group, Portland State University, Portland, OR 97207-0751, USA, V.A. SHCHUKIN, Ioffe Physico-Technical Institute, Politechniczeskaya 26, 194021, St-Petersburg, Russia; TU Berlin, PN5-2, Hardenbergst 36, D10623, Berlin, Germany, D. BIMBERG, TU Berlin, PN5-2, Hardenbergst 36, D10623, Berlin, Germany — The paper reviews the progress in growth and high resolution transmission electron microscopy (HRTEM) characterization of quantum dot (QD) nanostructures for the last 15 years. Understanding of structural properties of QDs resulted in realization of high-performance quantum dot lasers, amplifiers and single photon devices with precisely engineered properties (polarization, fine structure splitting, defect reduction and defect engineering). Furthermore, advanced QD growth including activated phase separation, submonolayer deposition, and combination of the approaches enabled nanostructures with a high density and uniformity of QDs leading to fabrication of vertical cavity surface emitting QD lasers with 20Gb/s operation in a temperature range 25-85° C without current or modulation voltage adjustment. The paper addresses current developments and challenges of HREM in application to nanostructures of low dimensionality including electron crystallography ("structural fingerprinting").

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