

Keynote Presentations at TSAPS Meeting 2020, Nov. 12-14, UTA

Single-Layer Coupled Quantum Dot Lattices

III-V semiconductor nanostructures, and especially quantum dots, are becoming ever more important for emerging photonic devices. Quantum dot structures have been obtained in various ways, including self-assembly, nanoscale etching and selective-area growth. Previous work on inverted quantum dot structures has shown that the crystal-like periodicity introduces potentially useful changes in the energy band structure including sharp, high-density states above the ground state. In this work we outline and compare various processes for obtaining engineered quantum dots and novel inverted quantum dot structures. We explore this structure for two dimensions and consider possible ways to extend it to three.

Dr. James J. Coleman received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Illinois, Urbana. At Bell Laboratories, Murray Hill, NJ, he contributed to the development of long wavelength 1.3 μm InGaAsP CW room temperature diode lasers grown by liquid phase epitaxy (LPE). At Rockwell International, Anaheim, CA, he studied MOCVD-grown heteroface AlGaAs solar cells, low-threshold single mode AlGaAs-GaAs double heterostructure lasers and quantum well heterostructure laser devices. He was professor of Electrical and Computer Engineering at the University of Illinois, Urbana for 31 years and held the Intel Alumni Endowed Chair. He and his students were the first group to define experimentally the ranges of wavelength, threshold current density, and reliability of 980 nm strained-layer InGaAs lasers. They are presently involved in developing high performance narrow linewidth DBR lasers, integrated lasers and other photonic devices by selective-area epitaxy, and the growth processes for quantum dot lasers. In 2019, he joined the university



Dr. J.J. Coleman

***Presidential Distinguished Professor
Dr. Richard N. Claytor Professor
Member of National Academy of Engineering
University of Texas at Arlington***

of Texas at Arlington as the Richard N. Claytor Distinguished Professor of Optics in Physics and the Alfred R. and Janet H. Potvin Chair in Electrical Engineering.

Professor Coleman has published more than 600 journal publications and conference presentations and 13 book chapters. He has 10 US patents and has given more than 100 invited presentations. He was president of the IEEE Photonics Society in 2010 and 2011 and was awarded the Society's Distinguished Service Award. Professor Coleman has won the John Tyndall Award of the IEEE Photonics Society and Optical Society of America, the SPIE Technical Achievement Award, the IEEE David Sarnoff Award, the OSA Nick Holonyak, Jr. Award, the ISCS Heinrich Welker Award, and the IEEE Photonics Society William Streifer Scientific Achievement Award. He is a member of the US National Academy of Engineering and a Fellow of the IEEE, OSA, SPIE, the American Physical Society, the American Association for the Advancement of Science, and the National Academy of Inventors.