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Quantum Dots-in-a-Well Infrared Photodetectors-Electronic Structure and Optical Properties HAKAN PETTERSSON, Center for Applied Mathematics and Physics, Halmstad University, Box 823, S-30118 Halmstad, Sweden, LINDA HOGLUND, Acreo AB, Electrum 236, S-16440 Kista, Sweden, FREDRIK KARLSSON, PER-OLOF HOLTZ, Department of Physics, Chemistry and Biology (IFM), Linköping University, S-58183 Linköping, Sweden, QIN WANG, SUSANNE ALMQVIST, Acreo AB, Electrum 236, S-16440 Kista, Sweden, CARL ASPLUND, HEDDA MALM, IRnova, Electrum 236, S-16440 Kista, Sweden, ERIK PETRINI, Acreo AB, Electrum 236, S-16440 Kista, Sweden, MATS-ERIK PISTOL, Solid State Physics and the Nanometer Consortium, Lund University, Box 118, S-22100 Lund, Sweden, JAN ANDERSSON, Acreo AB, Electrum 236, S-16440 Kista, Sweden — Quantum dots-in-a-well (DWELL) infrared photodetectors is a new class of nanophotonic devices with the potential of significantly increasing the performance and reducing the cost of infrared detectors. Here we present a comprehensive study of DWELL photodetector structures using a variety of optical techniques (PL, PLE, and PC). Complementary tunnel capacitance measurements support the electronic structure obtained from the optical measurements. A detailed energy level scheme based on the experimental findings is presented and compared to theoretical modeling. The presented work show the importance of combining different electrical and optical techniques to obtain a consistent model of complicated quantum structures which is crucial for the development of future nanophotonic devices.

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