Exponent®
Engineering & Scientific Consulting

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Professional Profile

Dr. Pooley's expertise is in semiconductor physics, quantum optics, and information science. His research background involves the development of semiconductor technology for quantum computing, and he has extensive experience designing, fabricating, characterizing, and modeling optoelectronic devices.

He provides a range of professional technical services to clients including:

- Scientific support for legal activities, such as Intellectual Property matters, International Arbitration, and other litigation.
- Failure analysis relating to semiconductor electronics, optical devices, optoelectronics and display technology, and digital control systems.
- Advanced image processing, thermal (IR) imaging, and optical measurement techniques.
- Numerical analysis, such as Finite Element Modeling, for engineering and product design matters.
- Technical advice relating to software development and data analytics.
- Providing objective scientific advice to senior management executives of a startup company.

Prior to joining Exponent, Dr. Pooley worked as a Software Developer for COMSOL Multiphysics, creating tools to model established consumer products such as transistors, LED lighting, photodiodes, and photovoltaic cells. He also has significant hands-on experience of semiconductor fabrication and processing techniques in a cleanroom environment, including: sample cleaning and preparation, wafer cleaving, photolithography, metal deposition, etching, and device bonding/packaging.

Dr. Pooley completed his Ph.D. in the Semiconductor Physics Group at the University of Cambridge, UK, in conjunction with Toshiba Research Europe Ltd. His work involved a range of novel experiments that led to 7 publications in respected journals. In addition to his semiconductor fabrication skills, he has extensive experience in a range of spectroscopy, optical measurement, and material characterization techniques including, photoluminescence (PL), micro-PL, electro-PL, time-resolved PL, Fourier transform infrared spectroscopy (FTIR), photon correlation measurements such as HBT and HOM interferometry, atomic force microscope (AFM) imaging, and scanning tunneling microscope (STM) imaging. He also has a strong background in scientific programming and numerical simulation methods, and has developed systems for automatic data acquisition and processing, such as a piezo feedback system to stabilize alignment in optical measurements with long acquisition times, and analysis tools for easily extracting figures of merit from large data sets using fits to mathematical models.

Academic Credentials & Professional Honors

Ph.D., Physics, University of Cambridge, England, 2013

M.Sci., Physics, University of Nottingham, UK, 2009

Professional Affiliations

IEEE, Senior Member (#93621352)

Publications

Anderson DM, Fessler JR, Pooley MA, Seidel S, Hamblin MR, Beckham HW, Brennan JF. Infrared radiative properties and thermal modeling of ceramic-embedded textile fabrics. Biomedical Optics Express 2017; 8:1698-1711

Pooley, MA, Anderson DM, Beckham HW, Brennan JF. Engineered emissivity of textile fabrics by the inclusion of ceramic particles. Optics Express 2016; 10:10556-10564

Pooley MA, Bennett AJ, Stevenson RM, Farrer I, Ritchie DA, Shields AJ. Energy-tunable quantum dot with minimal fine structure created by using simultaneous electric and magnetic fields. Physical Review Applied 2014; 1:024002.

Pooley MA, Bennett AJ, Farrer I, Ritchie DA, Shields AJ. Engineering quantum dots for electrical control of the fine structure splitting, Applied Physics Letters 2013; 103:031105

Bennett AJ, Pooley MA, Cao Y, Skold N, Farrer I, Ritchie DA, Shields AJ. Voltage tunability of single-spin states in a quantum dot, Nature Communications 2013; 4:1522

Pooley MA, Ellis DJP, Patel RB, Bennett AJ, Chan AKH, Farrer I, Ritchie DA, Shields AJ. Controlled C-NOT gate operating with single photons. Applied Physics Letters 2012; 100:211103.

Bennett AJ, Pooley MA, Stevenson RM, Farrer I, Ritchie DA, Shields AJ. Free induction decay of a superposition stored in a quantum dot, Physical Review B; 84:195401.

Boyer de la Giroday A, Bennett AJ, Pooley MA, Stevenson M, Skold N, Patel RB, Farrer I, Ritchie DA, Shields AJ. All-electrical coherent control of the exciton states in a single quantum dot, Physical Review B 2010; 82:241301

Bennett AJ, Pooley MA, Stevenson RM, et al. Electric-field-induced coherent coupling of the exciton states in a single quantum dot. Nature Physics 2010; 6:947-951.

Selected Conference Presentations

Pooley MA, Bennett AJ, Stevenson RM, et al. Coherent electrical manipulation of a quantum dot qubit. APS March Meeting, Boston, MA, 2012.

Pooley MA, Bennett AJ, Stevenson RM, Ward MB, Patel RB, Boyer de la Giroday A, Skold N, Farrer I, Nicoll CA, Ritchie DA, Shields AJ. Observation of anticrossings in the exciton state of single quantum dots via electrical tuning of the fine-structure splitting. Journal of Physics: Conference Series 2011; 286:012026