Job Title: Process Development Scientist
State: Massachusetts
City: Lexington
Description: Group 87 — Advanced Imaging Technology

The Advanced Imaging Technology Group develops innovative silicon-based focal-plane technologies for both DoD and scientific applications, such as astronomy, remote sensing, and adaptive optics. These novel focal planes address DoD mission requirements that drive specialized architectures (such as: multiple or very high-speed image samples, time-of-arrival imaging, or noise-less image stabilization) or highly optimized device design and processing to achieve high quantum-efficiency and/or very low noise. Scientific research examples include the design, fabrication, and testing of world-class CCD imaging devices used in a variety of high-end scientific applications (for example, focal planes for the Chandra X-ray telescope and other pre-eminent astronomical observatories), demonstration of silicon-based photon-counting detector arrays, and development of 3D-integrated active-pixel sensors. The group has expertise in device/IC design, fabrication, custom packaging, and camera control and readout electronics.

These focal planes are fabricated in Lincoln Laboratory’s Microelectronics Laboratory -- a 200-mm silicon wafer facility with programs in large-format charge-coupled devices, avalanche photodiode arrays, high-performance CMOS active pixel sensors, deep-submicron digital and mixed-signal SOI-CMOS, three-dimensionally stacked circuits, as well as MEMS-based RF switches, mirrors, and optical waveguides. The facility supports full-flow bulk and SOI-CMOS circuit fabrication, including specialized processes for oxide-bonded and back-illuminated sensors. Projects range from new device concept design and implementation to construction of custom silicon imaging, mixed-signal and digital integrated circuits.

An individual is needed to lead the development of silicon integrated circuit processes, with a particular focus on imaging focal plane applications. The successful candidate will have both a broad background and detailed understanding of integrated circuit fabrication methods, semiconductor materials, device physics, and electrical characterization. Will work as part of a fast-paced interdisciplinary team to address projects spanning from development of novel process flows to maturation of existing CCD, APD, and CMOS active pixel sensor processes. Will be responsible for developing and detailing process flows, developing metrology plans, designing test structures, providing in-depth technical support of fabrication tools, and analyzing yield and performance data on devices. The position will entail close collaboration with device and circuit designers, and optional additional responsibilities in these areas. Devices are typically used in large-scale demonstration systems, so ability to achieve results on schedule is also of paramount importance.

Requirements:
PhD in Electrical Engineering, Material Science, or Physics. Hands-on experience in laboratory techniques for fabricating semiconductor devices, understanding of device physics, and experience with computer simulation for both process development and device modeling are essential. Strong experimental and analytical skills, excellent presentation and written skills, and the ability to work as part of a team are all essential. Knowledge of material science (particularly control and characterization of electronic, mechanical, and thermal properties of silicon and its compounds) and silicon-based processing of focal plane arrays, charge-coupled devices, avalanche photodiodes, or silicon-on-insulator (SOI) CMOS circuit technology is highly desirable. Proficiency with a high-level interactive data-analysis package such as MATLAB or IDL is desirable.

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