Nanoscale optical spectroscopy of oxide semiconductor and insulator interfaces reveals the impact of native point defects on charge transport, doping, Schottky barrier formation, and nanostructure growth. Depth-resolved and scanning cathodoluminescence spectroscopies measure the interface states at ultrathin high-K dielectric junctions, the formation, identification, and control of defects at ZnO surfaces and interfaces, and the electronic trap states at complex oxide surfaces and interfaces. Nanoscale surface photovoltage spectroscopy provides evidence for spontaneous ZnO nanostructure growth via defect formation as well as the dependence of localized states on atomic layer termination at complex oxide interfaces. Overall, this work reveals the interplay between electronic defects, polarity, and surface nanostructure.

**Biosketch**

Professor Brillson holds a joint appointment between the Departments of Electrical & Computer Engineering, Physics, and the Center for Materials Research at The Ohio State University. Previously he directed Xerox Corporation's Materials Research Laboratory with responsibility for Xerox's long-range physical science and technology programs in Rochester, N.Y. He is a Fellow of the Institute of Electrical and Electronics Engineers, the American Academy for the Advancement of Science, the American Vacuum Society, the American Physical Society, and a former Governing Board member of the American Institute of Physics. His awards include Xerox Corporation’s Outstanding Achievement Award, Surface Science Magazine’s Excellence Award, Citation Classic recognition by the Institute for Scientific Information, and the AVS Gaede-Langmuir award for demonstrating the fundamental importance of semiconductor interfacial bonding, metallurgical reactions, and defect formation on solid state material and device properties. His new textbook - *Surfaces and Interfaces of Electronic Materials*, L.J. Brillson (Wiley-VCH, Weinheim, 2010) is intended for a broad audience of materials science, electrical engineering, and physics students as well as professionals in the field of solid state physics and electronics.