



IEEE

**Ottawa
Section**



**Seminar by Joint IEEE Ottawa-Montreal Section DEIS Chapter,
IEEE Ottawa PES Chapters, and EPMG of INMS/NRC**

The IEEE Ottawa Section is inviting all interested IEEE members and other engineers, technologists, and students to a seminar on dielectrics and electrical insulation.

Luminescence and Space Charge Distribution in Polymeric Insulation subjected to High Electric Field

by

Dr. Soli Bamji, National Research Council, Ottawa

DATE: January 24, 2008.

TIME: 10:40 a.m. Registration and Networking; 11:00 a.m. – 12:00 p.m. Seminar.

PLACE: National Research Council, 1200 Montreal Road, Ottawa, Building M-36, Kelvin Room.

PARKING: No fee at the visitor's parking. Please respect restricted areas.

Abstract Dielectric materials constitute the backbone of all power devices and can directly influence the effective life of equipment already in service. Polymers such as polyethylene, crosslinked polyethylene and polypropylene are extensively used as dielectric materials in high voltage devices. These materials have excellent mechanical, thermal, and electrical properties but are susceptible to degradation caused by high electric fields. Power equipment usually operates at voltages where space charge injection can affect the onset of electrical aging, cause field distortions, decrease the withstand voltage of the polymeric insulation and lead to insulation failure.

This presentation will first describe the Electroluminescence (EL) technique, a novel method developed at NRC, to detect the very early degradation of polymeric insulation used in power devices. Next the Phase Resolved Pulsed Electro-acoustic (PRPEA) technique recently developed for measuring space charge distribution in polymeric insulation subjected to ac electric field will be described. It will be shown that at low electric field the maximum amplitude of the PRPEA signal changes linearly with the applied electric field but above a certain threshold field, which coincides with that of EL inception, there is a deviation from linearity. Also, by measuring the space charge distribution at various phase angles of the ac waveform it is possible to determine the field at which charges are injected into the polymeric insulation. Both, EL and PRPEA can provide information about the dynamics of charge injection and trapping in solid dielectrics under ac fields. Finally, the results of EL emission and space charge distribution in nanodielectrics, namely polymers containing nanoparticles, will be discussed.

Soli S. Bamji (F'96) received a Ph.D. in Physics from the Virginia State University in USA and pursued a Post Doctoral Fellowship at the College Militaire Royal in Quebec, Canada. He joined the National Research Council of Canada in 1980. His research interests include aging mechanisms of insulation used in power devices, electro-luminescence and space charge measurements and diagnostic techniques to assess the operating conditions of the dielectric materials in service.

Admission: Free. Registration required for security reasons.

To ensure a seat, please register by e-mail contacting:

Mahmoud.Abou-Dakka@nrc.ca