

Research of carrier recombination characteristics in Si and wide-band-gap materials

Wednesday 19 June 2024 15:40 (20 minutes)

Tomas Ceponis, Laimonas Deveikis, Eugenijus Gaubas, Jevgenij Pavlov, Vytautas Rumbauskas; Institute of Photonics and Nanotechnology, Vilnius University

Carrier recombination characteristics strongly depend on defect species present within the semiconductor material. The reduction of carrier lifetime correlates well with decrease of charge collection efficiency and with increase of the leakage current in particle detectors. In order to develop radiation hard particle sensors and to predict variations of sensor functional parameters with aging, the investigation of recombination processes in pristine and irradiated detector materials is of paramount importance. In this talk, contactless techniques based on measurements of microwave probed photoconductivity transients and different measurement regimes for extraction of surface and bulk recombination as well as trapping parameters will be discussed. The techniques, applied for investigation of ultra-short processes within carrier dynamics, by employing femtosecond laser pulses of variable wavelength and pump-probe setups, will be presented. The temporal resolution of the pump-probe technique is only limited by laser pulse duration (hundreds of femtoseconds), therefore this technique is appropriate for characterization of heavily irradiated structures, where ultra-fast processes in carrier dynamic appear. The application of the aforementioned techniques for characterisation of Si as well as wide-band-gap material based structures will be discussed.

Type of presentation (scientific results or project proposal)

Type of presentation (in-person/online)

Primary author: CEPONIS, Tomas (Vilnius University)

Presenter: CEPONIS, Tomas (Vilnius University)

Session Classification: WG3/WP3 - Extreme fluence and radiation damage characterization