Seminar of Department of Functional Materials
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Analysis of nanosecond time scale current flow dynamics in semiconductor devices with S-shape current-voltage characteristics.

D. Pogany
Institute for Solid State Electronics, TU Wien, Austria.

Current flow in semiconductor devices with S-shaped current-voltage characteristics can exhibit various stationary or non-stationary current density patterns. Examples of such devices are electrostatic discharge protection devices or power devices subjected to high current pulses of nanosecond to microsecond duration. These devices have npn or npnp structure and operate in breakdown or self-sustaining mode. The free carrier and thermal distribution in these devices can be visualized with ns time resolution using Transient interferometric mapping (TIM) technique, based on measuring changes in semiconductor refractive index. In this talk I will review our analysis of “stationary” current filaments, current flow instabilities, spreading fronts, thermally-driven moving current filaments and destruction events in Si devices, with few examples of GaN and diamond devices.

Dionyz Pogany received the Dipl.-Ing. degree in solid-state engineering from Slovak Technical University, Bratislava, Slovakia, in 1987, and the Ph.D. degree from the INSA de Lyon (Institut National des Sciences Appliquées de Lyon), Villeurbanne, France, in 1994. After his postdoc in CNET Grenoble in 1995, he has joined the Vienna University of Technology (TU Wien), Vienna, Austria. Since 2003 he has been an Associate Professor. His research area is semiconductor device physics and characterization.