

Development of materials and devices for advanced microelectronics at the Institute of Electrical Engineering, SAS, Bratislava

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The research and development at the Institute of Electrical Engineering, SAS, is focused on semiconductor, superconductor, oxide and magnetic materials, including theoretical and experimental study of their structural, optical, transport properties and devices for information technology and applied superconductivity. In the field of semiconductor science and technology our effort is focused on study and development of materials and devices for advanced microelectronics.

One of the most important topics is development of GaN-based electronics. GaN-based high-power switches are investigated for fast and efficient power transducers, for application in electric/hybrid cars or computer power suppliers. In the field of GaN-based electronics, SAS has a long term tradition in participating on several competitive European projects collaborating with leading research laboratories and industrial partners.

Another important topic is study of materials for application in future memory devices. Atomic layer deposition is used for preparation of thin oxide films (TiO_2 , HfO_2) for memory elements based on resistive switching. Resistive switching random access memory is considered as one of the most promising emerging memory devices.

We study also theoretically and experimentally magnetic effects in ferromagnetic nanoelements. Such nanomagnets are perspective for future non-volatile high-density memories. The challenge of the next experiments is to fabricate ferromagnetic nanodots and use them as the basis of the non-volatile memory.

Besides above mentioned research areas our effort includes advanced sensors of magnetic field, microwave power sensors for extreme conditions, gas sensors, X-ray detectors and structures for new types of solar cells.