New project on ferroelectric films: Cheaper, smaller and less energy consuming components for laptops, mobiles

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Chalmers University of Technology in Gothenburg, Sweden, has together with five European partners started a three year project, Nanostar, for mastering of nanostructured multifunctional ferroelectric films for low cost mass production of microwave devices.

The project costs are 4.1 million Euros of which 2.8 million is supported by the European Commision in the 6th framework programme while the rest is paid for by the partners. Coordinator of the project is Professor Spartak Gevorgian at Chalmers Department of Microtechnology and Nanoscience, MC2.

The main focus will be on the development of theory, fabrication processes and device demonstrators for functional validation of nanostructured multifunctional ferroelectric films and components applicable in microwave communication. Ferroelectrics considered in the project are complex metal oxide dielectrics and barium and strontium titanat, characterized by high dielectric permittivity. The dielectric permittivity of these materials is electric field dependent, allowing development of voltage controlled capacitors (varactors) and a large number of tuneable microwave components for microwave applications.

Professor Spartak Gevorgian: "The devices based on these films offer a substantial reduction of cost, sizes and power consumption, i.e. features

useful for power hungry microwave systems, especially in portable/handheld devices such as mobile phones, laptops etc. They can also be applied in adaptable/reconfigurable microwave systems consisting of a large number of tuneable components, such as large phased array antennas and tuneable metamaterials.

The innovations also include nanostructured ferroelectric films with engineered, radically new dielectric properties, and exploitation of new physical effects in nanostructured ferroelectrics for applications in devices with new functions. Further improvement of properties of ferroelectric films and devices in terms of reduction of the temperature dependence, dielectric hysteresis, losses, noise and parameter drift along with increased long term stability and tuneability are included in the project.

"Demonstrators will be developed for microwave communications applications, but they will also be potentially useful for optoelectronics and sensor applications. Tuneable TFBARs, which have no analogues in the electronics industry, are one of the typical new devices with new functions to be considered", says Spartak Gevorgian.

The partners in the project are: Chalmers University of Technology, Gothenburg, Sweden; Philips Electronics Nederland B.V, Eindhoven, The Netherlands; Ericsson AB, Mölndal, Sweden; Temex Filters (SAW) Business Unit of Temex; Sophia Antipolis, France; Swiss Federal Institute of Technology, Lausanne, Switzerland; and Electrotechnical University, St. Petersburg, Russia.

Source: Swedish Research Council

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