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Presentation 42: Optimizing Gallium Oxide Thin Films for Electro-Optical Applications

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Gallium oxide is an ultrawide bandgap semiconductor that has shown great promise in recent years due to its distinctive properties and wide range of potential opto-electronic applications. Ga_2O_3 thin films, which can be used in Deep-UV photodetectors, oxygen sensors or Resistive RAMs, for example, are inexpensive and easy to produce, benefit from commercial microfabrication techniques and can be applied in scalable designs. The purpose of this work is to use Radio-Frequency Magnetron Sputtering to obtain Ga_2O_3 thin films with different properties, characterizing them and optimizing this process. This analysis will be followed by the development of a device prototype based on a thin film, such as a solar-blind DUV photodetector or a waveguide in the DUV to Near InfraRed. These steps will be accompanied by the study, modification and improvement of a RFMS chamber developed for the deposition of Ga_2O_3 at high temperatures. As a whole, the thesis explores the entire end-to-end process, from the optimization of the deposition process, to the study and modification of the obtained thin films and, finally, the design and fabrication of a device prototype.

Presenter: SOUSA, Ana Sofia (Instituto Superior Técnico)