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## **Semiconductor Thin Films by Hybrid Pulsed Laser Deposition Methods**

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Pulsed Laser Deposition, PLD, is a flexible and low-cost thin film deposition method, widely used for the preparation of insulating, semiconducting and metallic thin films with thickness ranging from a few nanometers up to tens of microns.

In the present contribution we will describe our work during the past 15 years employing this method at IST, Lisbon. Straight-forward PLD was combined in some cases with presence of inert background gas, or with simultaneous addition of a plasma-enhanced chemical vapour deposition, CVD, of oxygen or nitrogen gas. In special cases we employed a cyclic hybrid process. Nanostructures like nanospheres and nanowires have been studied.

The films were characterized by different structural and optical methods including X-ray diffraction, atomic force microscopy (AFM), dark and photoconductivity, steady-state and time-resolved photoluminescence (PL), optical transmission spectroscopy and time resolved microwave conductivity (TMWC). Surface morphology and chemical composition was analysed with X-ray Photoelectron Spectroscopy (XPS).

We will highlight three examples of our experience and the advantages of PLD deposition of (a) semiconductors like thin films of GaN, (b) nanowires of ZnO, and (c) insulators like ferroelectric sodium-potassium-niobate (NKN).

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