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CENTRO DE INVESTIGAÇÃO DE MATERIAIS

i3N
INSTITUTO DE NANOESTRUTURAS, NANOMODELAÇÃO E NANOFABRICAÇÃO

INVITED SPEAKER

PROF. KILLIAM LOBATO

Assistant Professor in the area of Energy Engineering
Faculdade de Ciências da Universidade de Lisboa

Killian Lobato graduated with a Physics degree in 2003 from the University of Bath, UK. Having been enticed into undertaking a PhD in the Chemistry department of the same institution to study the exciting dye-solar cell, he obtained his PhD in 2007. Having spent nearly 8 years abroad, he took up a post-doctoral position at the Uni. Lisbon to continue working on silicon growth techniques of solar cells.
As of December 2013, Killian Lobato is an Assistant Professor in Energy Engineering and lectures courses on Solar PV and Solar resource, Electrochemical Energy Storage and Conversion, and Renewable Energy Systems.
His particular research interests currently are: Tunnel junctions for silicon-perovskite tandem solar cells; Carbon based supercapacitors; Laser annealing for CIGS solar cells; Operation and Maintenance of Photovoltaic systems; and Solar resource in complex urban environments.

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TWO EXAMPLES OF LASER PROCESSING AS A SCALABLE TECHNIQUE FOR ENERGY APPLICATIONS: TUNNEL JUNCTIONS FOR TANDEM SOLAR CELLS AND IONIC TRANSPORT ENHANCEMENT IN SUPERCAPACITORS.

20TH
JULY, 2022
12:00 P.M.

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SEMINAR

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Most energy conversion and storage materials and devices must be efficient, low-cost and manufactured at enormous scales. Efficient devices have a typical active thicknesses between 1 to 500 microns (z direction). However, these must be produced on large areas (up to several m2) with a minimal variation in the film properties and composition in the z-direction. In essence, microelectronics (and nano!) is applied to the x-y macroscale.

Lasers have come a long way since their invention and are now ubiquitous in R&D and industrial environments. This talk will focus on how lasers are being used to form tunnel junctions for perovskite on silicon tandem solar cells, and on modifying carbon supercapacitor electrodes.

Gas Immersion Laser Doping (GILD) is a technique which permits the doping of semiconductors high doping concentrations and abrupt changes in doping concentration – requirements for tunnel junctions. We will discuss our recent progress in adapting this technique to be scalable and applicable for tandem perovskite on silicon solar cells.

A limitation of supercapacitor electrodes is that their energy density decreases at high power densities. This is a result of impaired ionic transport, reducing the effective capacity area. Laser ablation has been used to create ionic channels in carbon based porous which enables faster ionic transport through the supercapacitor electrode and hence faster charging and discharging currents, resulting in higher specific power and energy densities of supercapacitor electrodes.

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