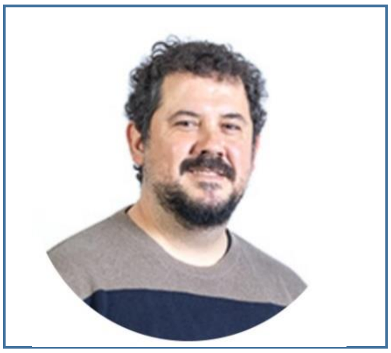
NETPORE
Network on porous semiconductors and oxides

PRESENTER INFORMATION



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BIOGRAPHICAL SKETCH

Aitor Lopeandia is Associate professor of Applied Physics at the Physics department of the Universitat Autònoma de Barcelona and Senior Researcher at the Catalan Institute of Nanoscience and Nanotechnology-ICN2. He received a PhD in Material Sciences (2007) at the Universitat Autònoma de Barcelona (Spain), working in the development of nanocalorimetric devices. In 2007 he moved initially as José Castillejo fellow and after as IEF Marie fellow (2008-2010) to the Institute Néel-CNRS (France). In 2010, he was recipient of a ERG fellow from FP7 and returned to the UAB as lecturer joining the research Group of Nanomaterials and Microsystems (GNaM). From 2010 at Physics and Nanoscience and nanotechnology degrees, coordinator the Master of Advance Nanoscience and Nanotechnology and currently from 2021 coordinator of the PhD program in physics at UAB. His research interest revolves around thermal properties of nanoscaled materials, and their applications in energy.

Links :

TITLE

Measurement of thermal conductivity of ZnO coated nanowires using four-probe thermal conductivity method with AC measurements.

ABSTRACT

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The four-probe thermal conductivity measurement developed by Li Shi and colleagues [1] is the most suitable method for measuring the conductivity of nanowires. This method enables the determination of thermal contact resistance, a critical factor in accurately determining the thermal conductivity of the

samples in a metrological context. In situations where the sample diameter reduction imposes a lower limit on thermal contact resistance, the thermal drop resulting from heat flow through these resistances can sometimes surpass the temperature drop across the nanowire itself. In this project, Finite Element Modelling is employed to explore the correlation between the uncertainty in determining the thermal conductance of the sample and the thermal conductance of the measuring lines in the device. Microfabricated devices were fabricated with an optimized structure specifically tailored to measure wires with thermal conductance ranging from 1- 100nW/K. As main source of uncertainty relies in the temperature drop determination, we redesigned the measuring setup to incorporate a high-frequency AC approach, mimicking the original DC measurement but with improved temperature signal-to-noise ratio, achieving values of 10^5. Using this methodology, the uncertainty in determining the thermal conductivity of ZnO ALD coated nanowires can be reduced to the intrinsic limit of the uncertainty in determining the geometrical parameters.

[1] Li Shi, Review of Scientific Instruments 86, 044901 (2015).