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Preface

Special issue on Nanowires

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Nanowires are filamentary crystals with a controlled diameter in the range between a few and hundreds of nanometers. Their particular shape and dimensions render them to be extremely interesting for fundamental and applied science. Since 1990 when, for the first time, the word 'nanowire' appeared in a publication[1], nanowires have inspired and excited thousands of scientists and engineers around the globe. The reasons for this exponentially increased interest lie in the extraordinary opportunities that nanowires bring to fundamental and applied studies. The one dimensional nature seems ideal for the study of one-dimensional charge transport, leading to a very special configuration for mesoscopic transport studies. Being a diameter smaller than the wavelength of light in the optical domain, interaction of nanowires with light gives rise to a variety of new phenomena which find applications in next generation solar cells, photo-detectors, light emitting diodes and lasers.

This special issue represents, in a very good manner, the state-of-the-art of the field. Starting with a very complete review on nanowire-based solar cells fabricated from a full plasma-enhanced chemical vapor deposition process [1], it follows-up with many important specialized topics. Publications [2–6] report on recent findings in the synthesis and fabrication of III–V and II–VI nanowires. The important topics are here related to the integration of III–Vs on silicon as well as novel functionalization of ZnO with Mn and polymers. This special issue continues with studies on the optical properties of nanowires [7–13]. Bandgap and shape engineering in core–shell structures are considered for the improvement or modification of light emission. This section of the special issue finishes with the full characterization of an optically-pumped ZnS laser [13]. After a theoretical study on the doping of Si and Ge nanowires [14], sophisticated electronic transport studies are reported [15, 16], which include a ZnO transistor absorbing light below the bandgap and the electrostatic manipulation of spin in nanowire heterostructures. The issue is finalized by two contributions on nanowire-based solar cells [17, 18], which are believed to be very good candidates for next generation photovoltaics.

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We hope you will enjoy reading this special issue and that you will be inspired by the new discoveries reported on it.

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