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Semiconductor Nanostructures for Optoelectronics and Energy Applications

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Semiconductors have played an important role in the development of information and communications technology, solar cells, solid state lighting. Nanowires are considered as building blocks for the next generation electronics and optoelectronics. In this talk, I will present the results on growth of nanowires, nanomembranes and microrings and their optical properties. Then I will discuss theoretical design and experimental results on optoelectronic devices. In particular, I will discuss nanowire and micro-ring lasers and integration of nanowires and microrings. Nanowire based energy devices such as solar cells and photoelectrochemical (PEC) water splitting will be discussed. I will present the results on chemical and bio sensors and neuro-electrodes to study brain signaling to understand dementia. Future prospects of the semiconductor nanostructures will be discussed.