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Nanomembrane photonics for Si photonic integration and flexible optoelectronics[1]

WEIDONG ZHOU[2], University of Texas at Arlington

Crystalline semiconductor nanomembranes (NMs) offer unprecedented opportunities for unique electronic and photonic devices for vertically stacked high density photonic/electronic integration, high performance flexible electronics, and adaptive flexible/conformal photonics. Research progresses have been made in the areas of optical filters/modulators, spectral selective IR photodetectors, flexible LEDs, solar cells, and novel light sources, based on quantum dots, Fano resonance photonic crystal cavities, and heterogeneous integration of III-V/Si material systems. The potentials and prospects of nanomembrane photonics will also be discussed, for a wide range of applications, in the areas of hyper-spectral imaging and gas sensing (lab-on-a-chip), high capacity data network and optical computing (WDM-on-a-chip), high performance flexible inorganic displays, solid state lighting, and photovoltaic solar cells, etc.

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[2]2nd author: Zhenqiang Ma, Department of Electrical and Computer Engineering, University of Wisconsin-Madison, WI 53706, USA