

Nanoscale approaches for creating future infrared sensing materials

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As the development of the third generation of infrared detector arrays, based on semiconductor alloys, nears completion, new methods for creating infrared (IR) sensing are of increasing interest. Several issues remain to be addressed by future IR sensing systems. For instance, increasing the temperature of operation of an infrared system without sacrificing performance has high payoff in system cost, weight and reliability. High sensitivity at room temperature is an ultimate goal. There is also increasing interest in hyperspectral sensing where more than three narrow wavelength bands would be utilized simultaneously. Conventional approaches limit how many bands can be designed and accessed simultaneously within a single pixel. Integration of signal processing devices on the same chip as the detectors is another future goal, as well as higher resolution arrays. Some of the materials that may address these needs are nano-controlled materials such as superlattices, quantum dots, carbon nanotubes and biological structures. The progress and potential of these next generation nanoscale materials for IR sensing applications will be reviewed.