

Colloidal quantum dots for low-power-consumption semiconductor gas sensors

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Gas sensors are becoming increasingly important to the safety and quality of human life. In the past decades, semiconductor gas sensors employing high-temperature ceramics technology have been intensively investigated and higher sensitivity as well as selectivity have been achieved. Silicon-based micro-electro-mechanical system (MEMS) hotplates have also been utilized to reduce both the volume size and power consumption of semiconductor gas sensors. Colloidal quantum dots (CQDs) possess highly sensitive and programmable surface, combined with excellent solution processability, which make them ideal building blocks for next-generation gas sensors compatible with silicon-based or flexible substrates. Through the controllable synthesis with surface and interface engineering strategy of CQDs, we have demonstrated sensitive and selective semiconductor gas sensors with lower power consumption based on metal sulfides [1,2] and oxides [3,4], respectively. In addition to traditional rigid substrates including ceramics and Si-based MEMS hotplates, soft substrates being flexible and stretchable were successfully used for the CQD gas sensors, which may open up a powerful new degree of freedom to semiconductor gas sensors being more intelligent and integratable.

Summary

Topic

1. Physical and Chemical Sensors

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