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## Prussian Blue analogue derived porous NiFe<sub>2</sub>O<sub>4</sub> nanocubes for low-concentration acetone sensing at low working temperature

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### Abstract

Real-time detection of acetone vapor at low concentration plays a decisive role in early noninvasive diagnosis of diabetes. In this work, porous NiFe<sub>2</sub>O<sub>4</sub> crystalline nanocubes have been scalably prepared via an as-developed cost-efficient and facile strategy, which involves a morphology-inherited annealing treatment of single-resource Prussian Blue analogue of Ni<sub>3</sub>[Fe(CN)<sub>6</sub>]<sub>2</sub>·xH<sub>2</sub>O solid nanocubes as self-sacrificial templates. The porous NiFe<sub>2</sub>O<sub>4</sub> crystalline nanocubes are demonstrated to be composed of primary nano building blocks and interconnected pores. When utilized as sensing materials, the as-synthesized NiFe<sub>2</sub>O<sub>4</sub> exhibited p-type gas-sensing behavior that the resistance increases in a reducing gas atmosphere. Furthermore, the as-fabricated NiFe<sub>2</sub>O<sub>4</sub> sensor was sensitive and selective to acetone gas with an obvious response value of 1.9 at its low concentration (1 ppm) and low detection of limit (0.52 ppm) at a quite low working temperature (160 °C). In addition, the sensing mechanism is deeply investigated. More significantly, our prominent findings herein shed light on the fabrication of metal oxide based gas sensors in environmental and medicinal fields.

**Key words:** acetone; gas sensor; NiFe<sub>2</sub>O<sub>4</sub> nanocubes; low concentration; Prussian Blue analogue

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