

Novel Ni₃S₂ based room temperature humidity sensor and potential breath analyzer

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Abstract

Nanostructure based semiconductors have recently been considered for relative humidity (RH) monitoring due to their superior surface chemical properties when compared to their bulk counterparts. The RH sensing is measured by using a change in resistance of the material in different RH environments. Rhombohedral phase Ni₃S₂ nanostructure based flower-like structures were synthesized via a low cost microwave assisted hydrothermal method. The flowers were mounted on a device and analyzed for RH sensing. A sensing response of up to 116 times was achieved for the device at 63 % RH, which is higher than the response that has been reported for ZnS nanowires for 75 % RH. The evaluation of exhaled breath components by use of a gas sensor in order to improve the diagnosis and monitoring of respiratory and systematic diseases is growing very fast. The response measurement of the Ni₃S₂ device when exposed to human breath measured at different time intervals was investigated and preliminary results are presented.