

# Nanocomposites and nanomaterials

## The prospects of nanostructured TiO<sub>2</sub>-based gas sensors using for the detection of CO

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Metal oxide semiconductor gas sensors have lots of domestic and industrial applications. They are relatively inexpensive, lightweight, long lasting, highly sensitive and benefit from quick response time. They are used extensively to measure and monitor trace amounts of environmentally important gases [1].

Carbon monoxide (CO) is a colorless and odorless gas that is harmful to both public health and environment. Its concentrations are particularly high in areas of industry, where fossil fuels are incompletely combusted for energy purposes, and in cities with high levels of traffic. Therefore, it is extremely important to monitor the levels of CO in the environment in order to maintain air quality standards [1,2].

A gas sensor with high selectivity and sensitivity and with low operating temperature drives the research in this field. Titanium dioxide (TiO<sub>2</sub>) shows great technological potential due to its stability and sensitivity at different operating temperatures. The sensitivity is significantly improved with nanostructured TiO<sub>2</sub> because of its large surface-to-volume ratio and a grain size comparable to the depth of space-charge layer. Modification of the sensing surface of nanostructured TiO<sub>2</sub> with noble metals, metal oxides or polymers effectively improves interaction between surface and gas molecules, reduces operating temperature and enhances electron transfer [1,2].

Although, many metal oxide based chemical sensors are commercially available, yet detecting toxic CO in low concentrations still remains a complex task. Various morphologies of the nanostructured TiO<sub>2</sub> offer a possibility that a selective and highly-sensitive sensor could be fabricated.

1. *Fine G. F., Cavanagh L. M., Afonja A., Binions R.* Metal oxide semiconductor gas sensors in environmental monitoring. Review // Sensors.-2010.-**10**.-P. 5469-5502.
2. *Castelino R., Pramod N. G.* Selective CO sensing using nanostructured TiO<sub>2</sub> gas sensors. Review // Int J on Smart Sens and Int Sys.-2016.-**9**, N 4.-P. 2237-2256.