

## New Sensor to Prevent Accidental Gas Leakage

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Accidents and death due to Carbon Monoxide gas leakage in homes and factories can now be prevented by installing a Cobalt nanoparticle-based biosensor developed by researchers at Institute of Chemical Technology, North Maharashtra University in collaboration with University of Mumbai, Maharashtra in their recent study.

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Carbon monoxide is formed as a result of incomplete burning of fuels such as gas, oil, coal or wood that are commonly found in our houses in central heating systems, boilers, water heaters, and open fire chimneys. An improperly ventilated house with increased levels of Carbon monoxide can cause poisoning leading to nausea, dizziness, stomach pain, short of breath and even death. This is because Carbon monoxide binds to Hemoglobin in the blood forming carboxyHb that restricts the supply of Oxygen to the tissues of the body causing death or serious damage to organs.

The human body cannot sense Carbon monoxide because it is odorless, tasteless and is non-irritating. Hence, we need Carbon monoxide detectors in our homes and industries to prevent Carbon monoxide poisoning and resulting fatality. Detecting Carbon monoxide is challenging because of its redox inactivity at room temperature. Researchers at Institute of Chemical Technology, North Maharashtra University in collaboration with University of Mumbai, Maharashtra have developed a novel Nano composite sensor for Carbon monoxide by grafting nanoparticle Cobalt Oxide ( $\text{Co}_3\text{O}_4$ ) in PANI matrix which is an intrinsically conducting polymer that is known for its modifiable electrical conductivity, low cost, ease of synthesis and excellent sensing capacity. Scientists proudly claim, "the sensor fabrication as reported in this work is one that is both facile and economical which, coupled with significant performance has much potential in the field of gas sensors".

The method of synthesizing Cobalt Oxide ( $\text{Co}_3\text{O}_4$ ) nanoparticle is easy and cost effective. It uses NaOH that is added to Cobalt Chloride ( $\text{CoCl}_2$ ) drop wise under ultrasound that forms  $[\text{Co}(\text{OH})_2]$ , which after sonication, centrifugation, washing with water and rinsing with acetone forms 23nm wide  $\text{Co}_3\text{O}_4$  nanoparticles. They are grafted in PANI and doped with HC (made from  $\text{HCl}/\beta\text{-CD}$ ) to form the resulting nanocomposite called PANI/HC/ $\text{Co}_3\text{O}_4$ .

The researchers have found that the biosensor efficiently senses carbon monoxide in a very short response time of 40-45 seconds. The scientists are trying to improve the nanocomposite that suffers from a low sensing response in high humidity. The biosensor can be used to make Carbon monoxide detectors for homes and factories to prevent accidents and death due to Carbon monoxide leakage and accumulation.

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