# Nanostructured tin gas sensors could help the world tackle the climate crisis

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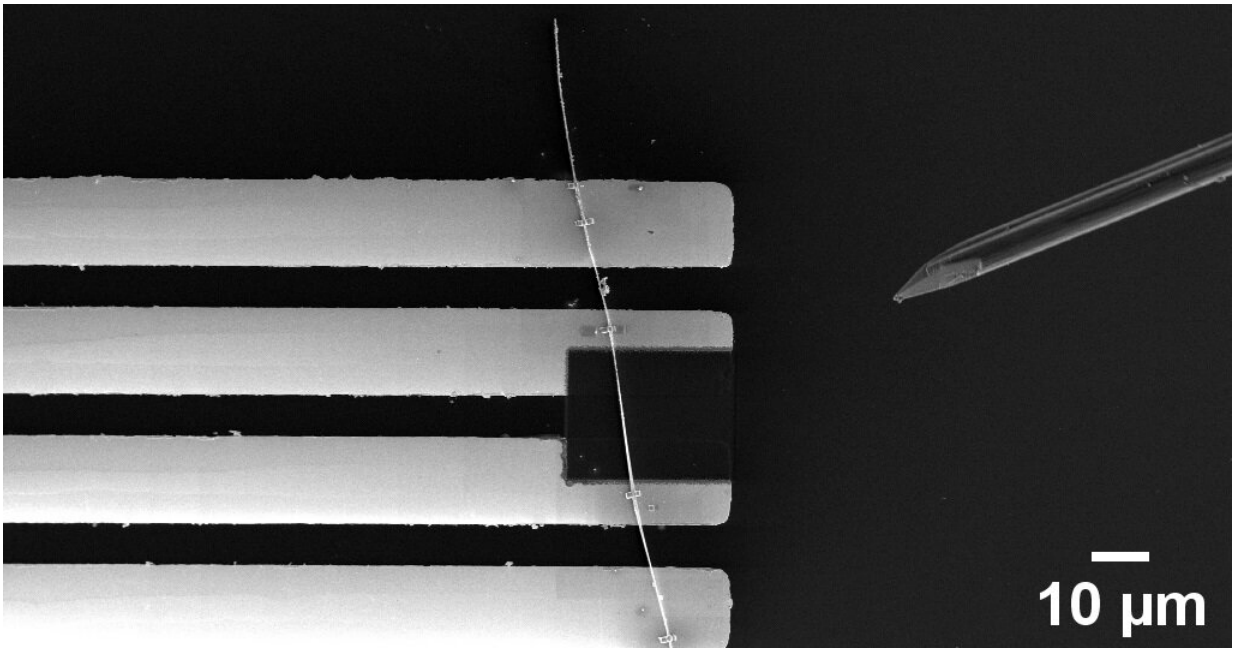


Scanning electron microscopy (SEM) image showing an example of a nanofabricated single-element device used for the gas sensing measurements. The nanostructure was nano-manipulated onto gold electrodes inside a Dual-Beam (Scanning electron microscope/Focused Ion Beam) microscope. Small platinum pads were done via electron beam induced deposition (Pt-EBID), and ensured an electrical contact between the gold electrodes and the nanobelts. Credit: University of Surrey

Researchers from the University of Surrey believe that tin-based gas

sensors could help track and control harmful nitrogen ($NO_2$) gases that pollute our planet.

In a paper published by the *Physical Chemistry Chemical Physics* (*PCCP*) journal, researchers from Surrey, in collaboration with colleagues from São Paulo State University (UNESP), Brazil, detail how gas sensor devices can play an important role in the fight against climate change by monitoring emission sources such as nitrogenous gasses.

The research team used different combinations of the tin oxide system and constructed two device groups: devices containing a single structure nanofabricated in a Dual Beam Microscope; and a number of them in a "carpet" mode. The two devices configuration allowed the researchers to estimate the materials depletion layer (Debye length), and to propose gas-solid interaction mechanisms between the $NO_2$ and the reduced/stoichiometric surfaces.

Professor Ravi Silva, Director of the Advanced Technology Institute and Head of the Nano-Electronics Center at the University of Surrey, said: "Our remarkable team of researchers at Surrey and colleagues in São Paulo have been assessing and developing gas sensor devices to help tackle the climate crisis—the top priority of our time. We will do all we can to help the world reach net zero by 2050."

Mateus Masteghin, the lead author of the study and Ph.D. student at the University of Surrey, under the supervision of Dr. David Cox (co-author in the publication), said: "The internship that allowed this work to be done was an opportunity of a lifetime and I am very grateful for that. I was an M.Sc. student in Brazil supervised by Professor Marcelo Orlandi (UNESP), and came to spend about three months at the University of Surrey under the supervision of Professor Ravi Silva. I had the chance to work with amazing researchers at two prestigious universities, from whom I learned so much. We hope that this study furthers the

understanding of tin oxide-based $NO_2$ detectors."

**More information:** Mateus G. Masteghin et al, The role of surface stoichiometry in NO2 gas sensing using single and multiple nanobelts of tin oxide, *Physical Chemistry Chemical Physics* (2021). DOI: 10.1039/D1CP00662B

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