Plan Overview

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Title: Reduced Graphene (rGO) and Semiconductor Metal Oxides (MOS) based nanocomposites for application as toxic gas sensors

Creator: Valmor Mastelaro - **ORCID:** 0000-0002-6512-2530

Affiliation: Universidade de São Paulo (www5.usp.br)

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Project abstract:

The detection of different types of gases is becoming more and more important in our society due to the need to identify toxic gases and organic vapors for environmental and human safety, for emission/control in the industrial sector and for medical diagnosis. Efforts by the scientific community working in this area of research are dedicated to the research of new materials capable of detecting gases at room temperature, in standard environmental conditions, and that present high selectivity and sensitivity. Among the materials that have been considered promising and that present these characteristics is obtained through the association of semiconductor metal oxides (MOS) and reduced graphene (rGO). The association of graphene with MOS, compared to MOS-only sensors, has shown better performance in gas detection in many aspects, such as sensitivity, response/recovery times and operating temperature. Although different works on this topic have been published recently, many aspects of research in this area are still open. In this context, the general objective of the research project is the study of sensor properties in relation to different toxic gases of composite materials formed by reduced graphene (rGO) and semiconductor metal oxides (MOS). Determining which are the best conditions (rGO/MOS ratio and MOS morphology) that lead to better sensor properties and the mechanisms involved in the process will be fundamental for the project's success. To achieve these goals, we will obtain samples of reduced graphene (rGO) from graphene oxide using a laser radiation source; obtain nanostructured samples in powder form of the semiconductor metallic oxides ZnO, In2O3-SnO2 (ITO), WO3 and CuO through the polymeric precursor method; obtain nanostructured MOS samples with different morphologies using nanocellose as a template and finally, perform the synthesis of MOS/rGO nanocomposites whose sensor properties will be characterized. As innovative aspects of the project, the use of laser radiation in the graphene reduction process and the use of nanocellulose as a template to obtain metallic oxides with different morphologies can be highlighted. The samples obtained will be characterized using conventional and advanced techniques. Finally, the sensing properties of the pre-selected samples that present an adequate resistance value will be evaluated with different toxic gases (CO, CO2, Acetone, Ethanol, NO and O3). We hope with this project to contribute to the scientific and technological development of this very important area of research through new strategies for the synthesis of nanostructured materials, producing sensors that act at room

temperature and present a better degree of selectivity.

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Reduced Graphene (rGO) and Semiconductor Metal Oxides (MOS) based nanocomposites for application as toxic gas sensors

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Question not answered.

sim

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Text - "Reduced Graphene (rGO) and Semiconductor Metal Oxides (MOS) based nanocomposites for application as toxic gas sensors"

Planned research output details

Title	Type	Anticipated release date	Initial access level	Intended repository(ies)	Anticipated file size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
Reduced Graphene (rGO) and Semiconductor Metal Oxi ...	Text	2021-12-12	Open	None specified		None specified	None specified	No	No