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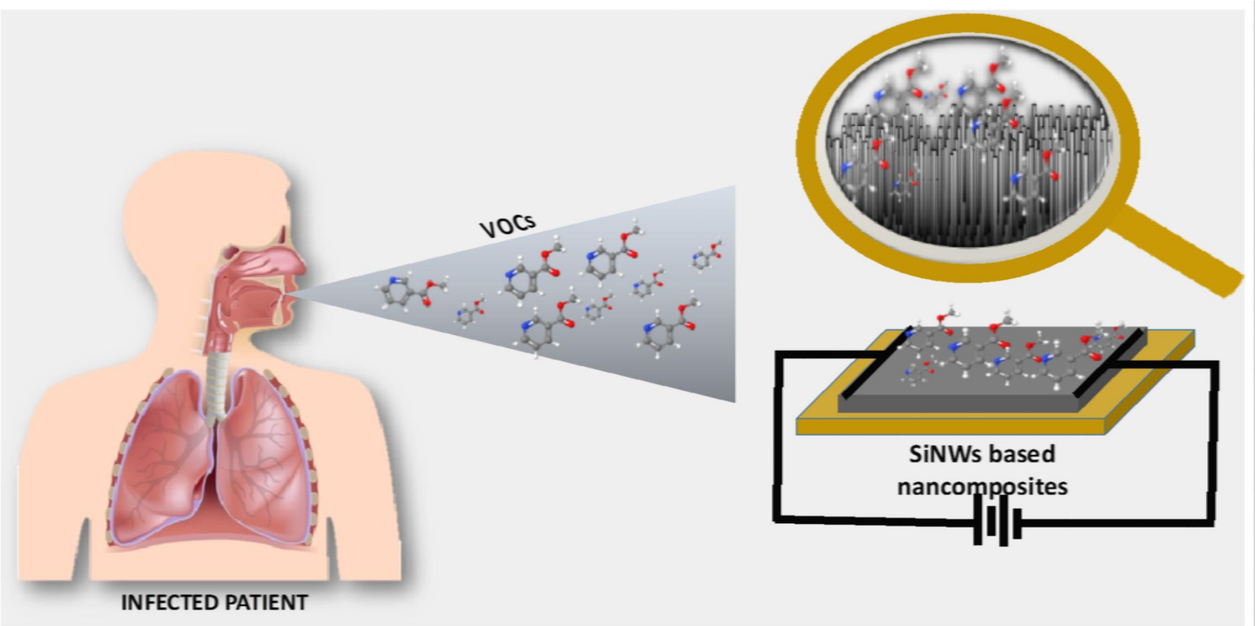
SILICON NANOWIRE BASED SENSING PLATFORM FOR THE DETECTION OF INFECTIOUS DISEASES

Varsha Gautam, Avshish Kumar, Vinod Kumar Jain, Suman Nagpal
Amity Institute for Advanced Research and Studies (Materials & Devices), Amity University, UP, 201303, Noida, India

Introduction

- In the past years, novel sensing platforms have been proposed to immobilize biomolecules, such as VOCs, antibodies, DNA, and enzymes to create highly sensitive and selective biosensors.
- Semiconductor nanowire - silicon nanowire (SiNW) has been recognized as a versatile electrical sensing tool owing to its high sensitive, real-time and label-free properties.
- We synthesized three Silicon nanowires (SiNW) based sensing platforms:
  - ✓ Reduced graphene oxide (SiNW/rGO)
  - ✓ Titanium dioxide nanoparticles (SiNW/TiO2)
  - ✓ Zinc oxide nanoparticles (SiNW/ZnO)



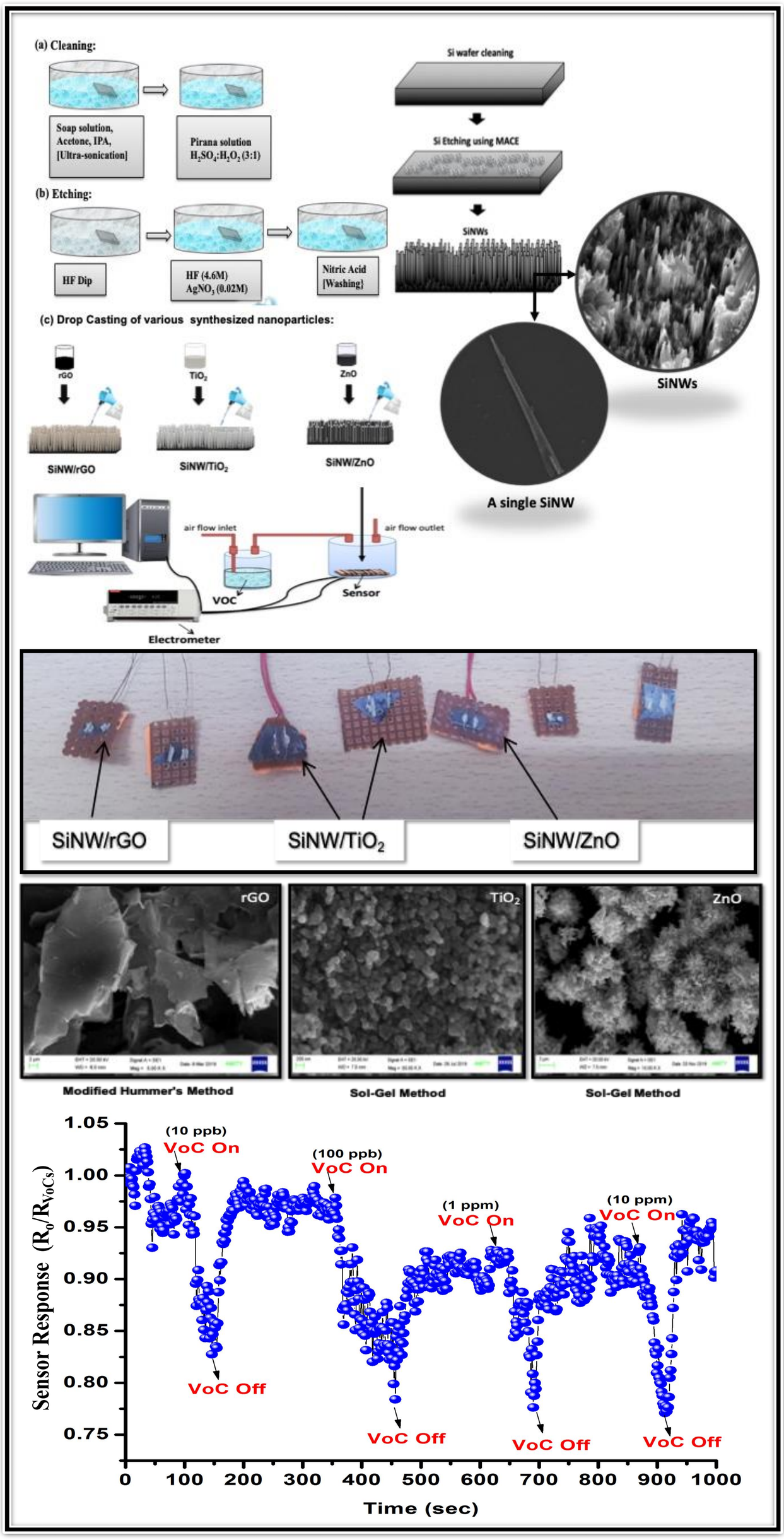
Material and Methods

- SiNW were synthesized using Metal assisted chemical ethching (MACE) technique whereas the reduced graphene oxide was synthesized using modified Hummer"s method and TiO_2 and ZnO using sol gel method.
- The synthesized sensing platform formed was characterized using SEM,TEM,EDX,FTIR and XRD techniques.
- The sensing properties of the so formed sensors were then checked for different VOCs biomarkers of infectious diseases.

Results

SENSOR	VOCS	RESPONSE	SENSOR RESPONSE	RECOVERY TIME (sec)	LOD
(SiNW/rGO)	Cyclohexane	1.07	30	60	1 ppm
(SiNW/rGO)	Formaldehyde	0.99	30	60	1 ppm
(SiNW/TiO_2)	Methyl Nicotinate	1.02	20	30	10 ppb
(SiNW/ZnO)	Formaldehyde	1.29	30	60	10 ppb

Ref : Gautam, V., Kumar, A., Kumar, R., Jain, V. K., & Nagpal, S. (2020). Silicon nanowires/reduced graphene oxide nanocomposite based novel sensor platform for detection of cyclohexane and formaldehyde. Materials Science in Semiconductor Processing, 105571.



Conclusion

The synthesized sensing platforms could pave the way for a novel strategy in the development of a point of care diagnosis for the detection of infectious diseases.

Acknowledgement

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