An Inkjet-printed amperometric H_2S sensor for environmental applications

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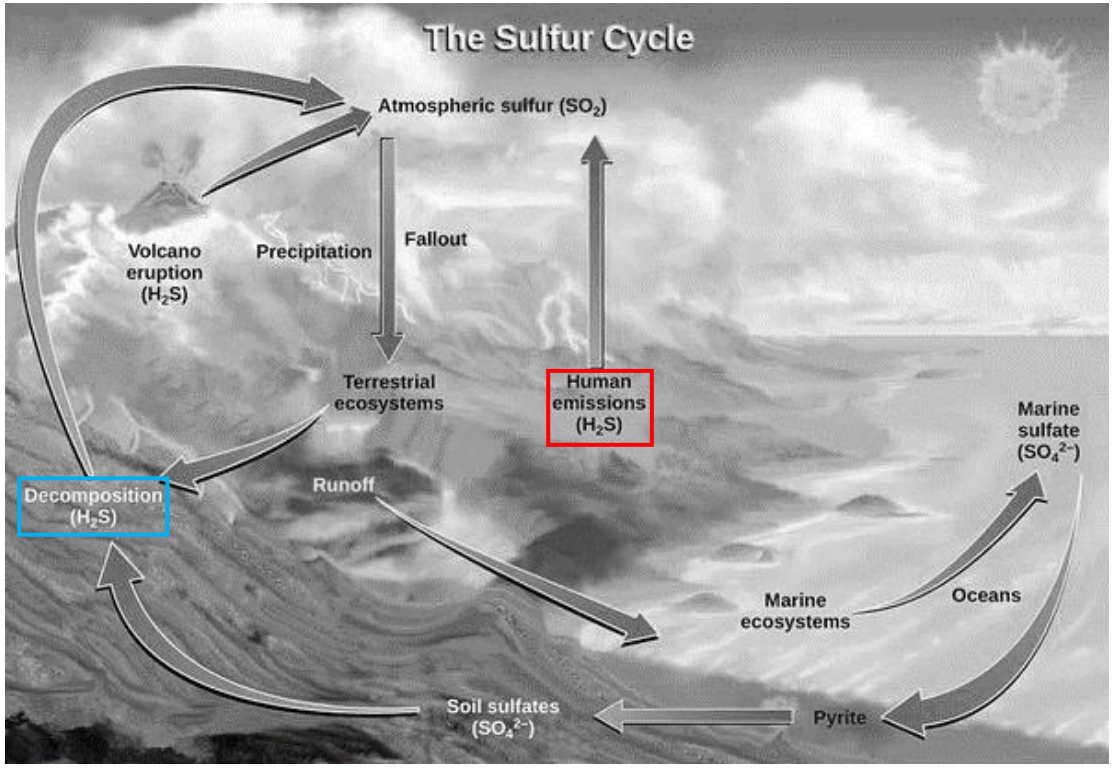
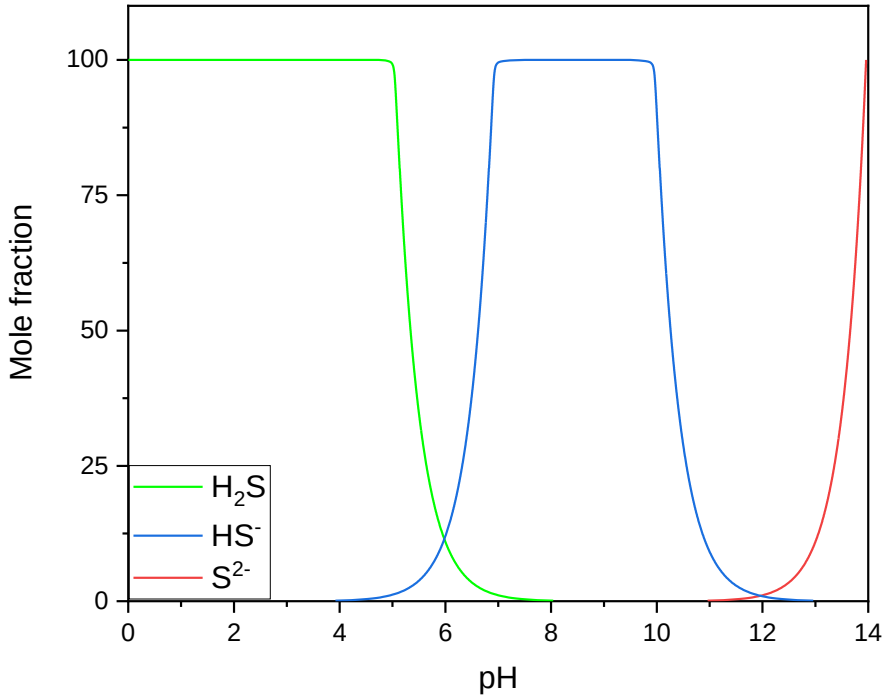
Sulfur cycle



Jones, A. M. Environmental Biology. Environ. Biol.2006, 1–197. https://doi.org/10.4324/9780203137574



Sulfhydric acid is a polyprotic compound with labile protons. Given that, it coexists as different species with different proportions depending on the medium's pH.

Design of the electrode

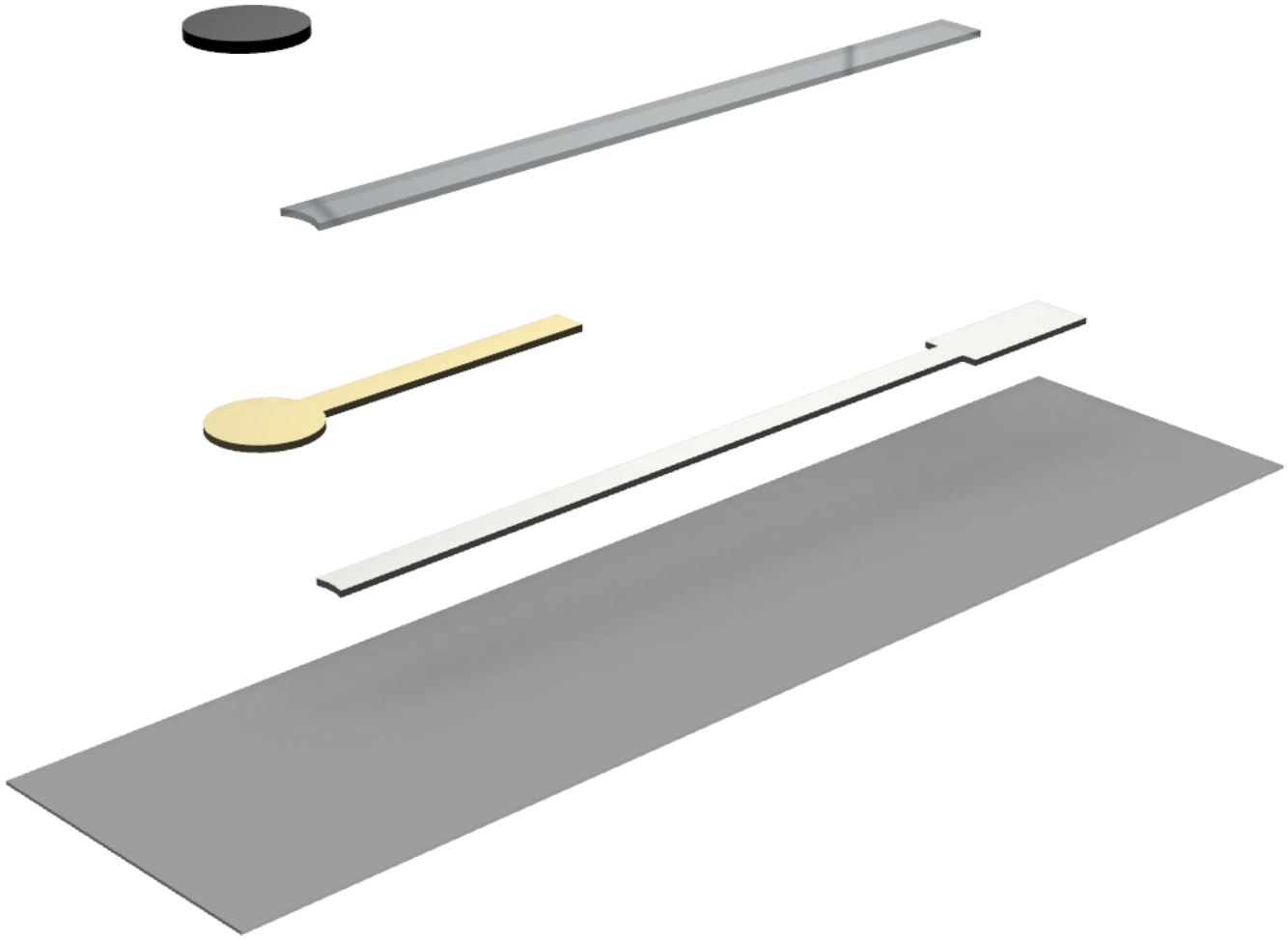
SWCNTs/SWCNTs-PVA

SU8

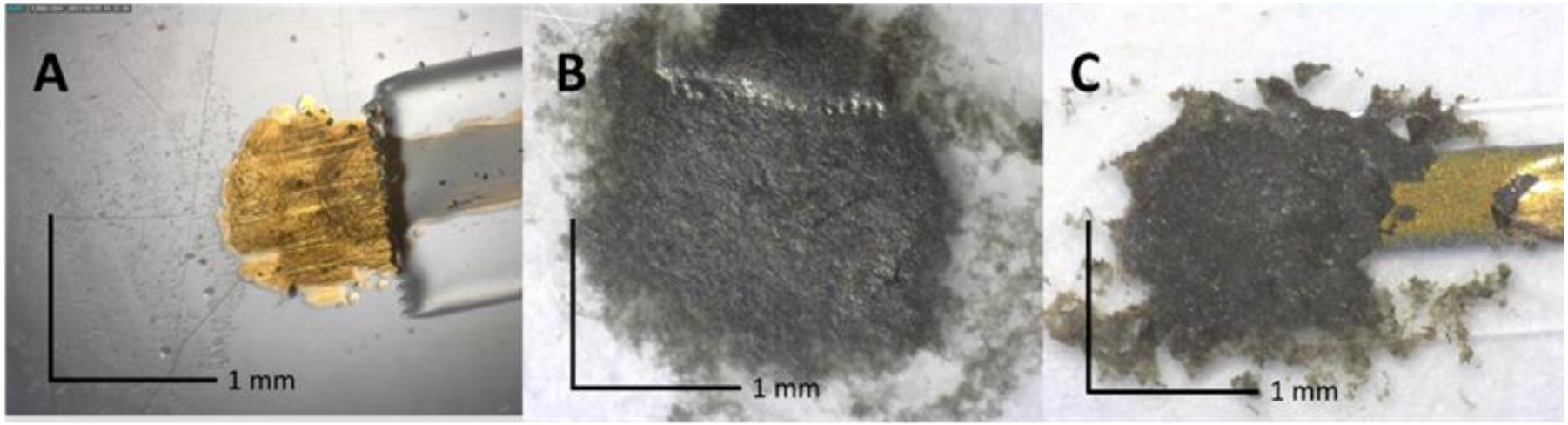
Au electrode

Ag tracks

PET substrate

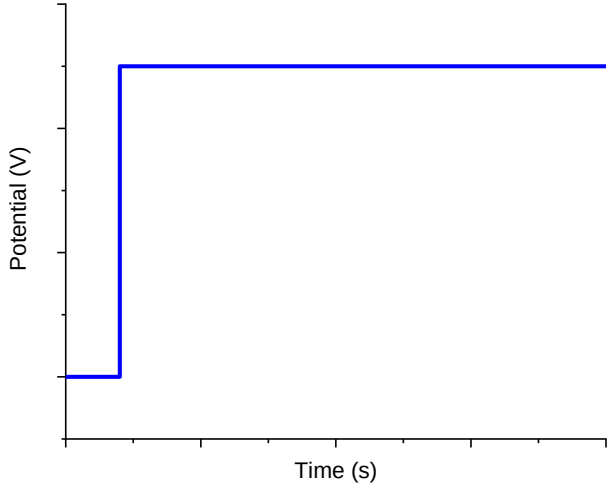


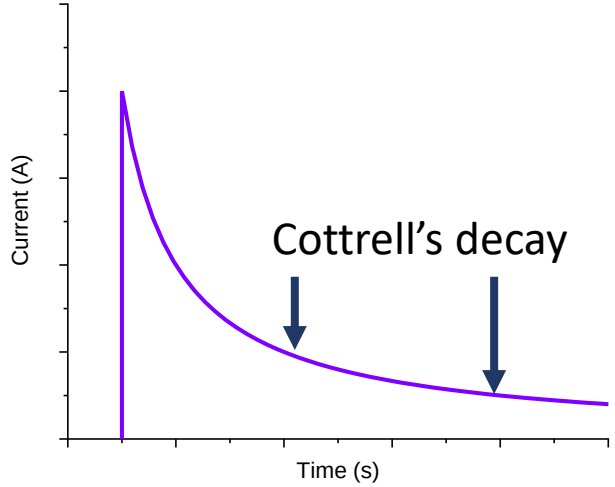
Morphological characterization



A) Inkjet-printed Au electrode
B) SWCNTs drop-casted over Au electrode
C) Drop-casted SWCNTs-PVA over Au electrode.

Technique basics

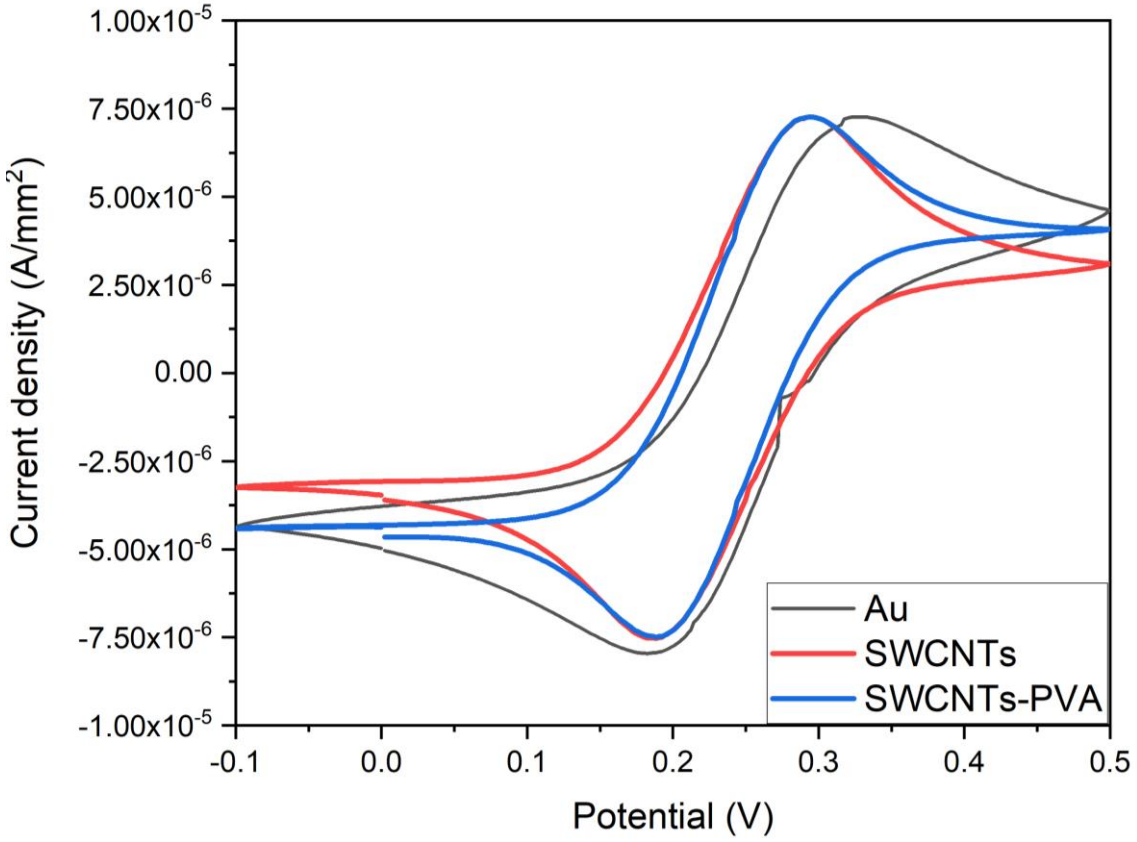




$$i = \frac{nFAc_j^0\sqrt{D_j}}{\sqrt{\pi t}}$$

Measured at the same time, current has a linear correlation to analyte concentration.

Electrochemical characterization

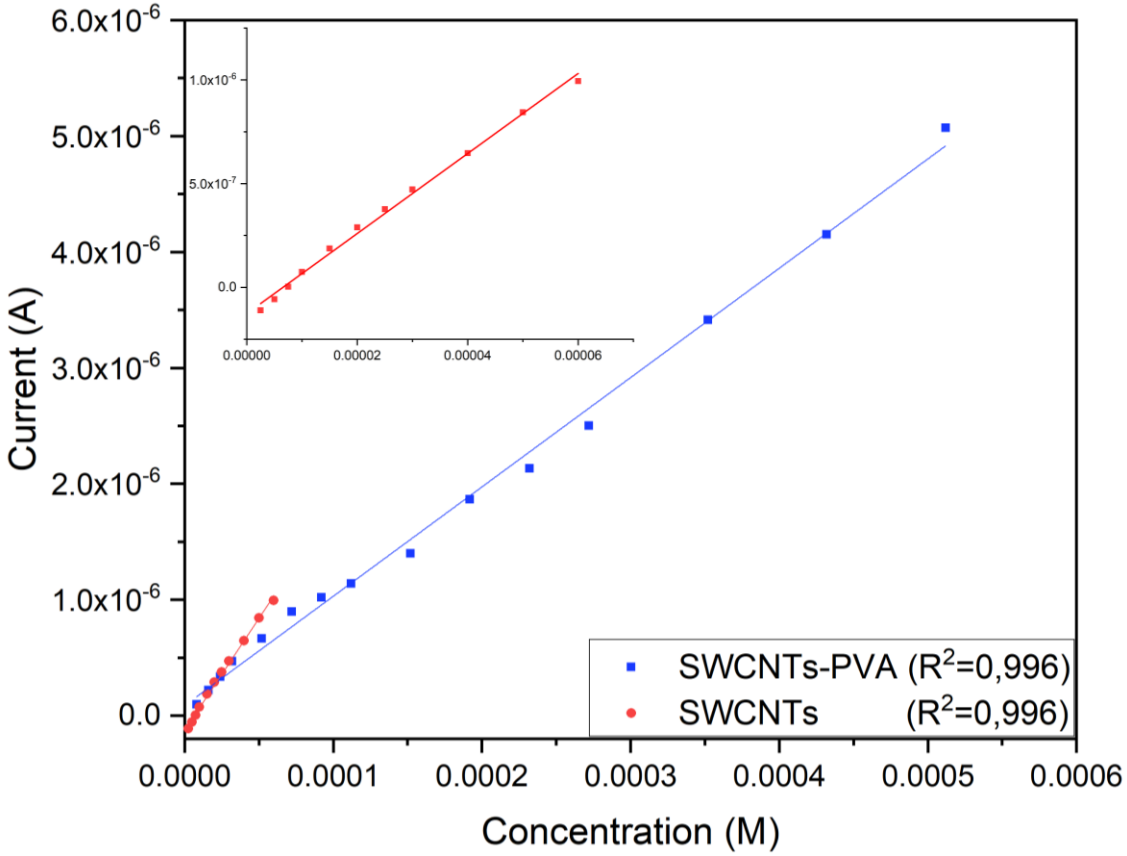


Modified electrodes presented similar current density and a smaller potential gap than Au bare electrodes

SWCNTs and SWCNTs-PVA are both favorable for an H_2S sensor due to their capacity for lower oxidation potentials

Lowered rates of sulfur deposition on their surfaces due to the less favorable interaction S-C against S-Au

Results: H_2S sensor



SWCNTs: (19.3±0.4) mA/M
SWCNTs-PVA: (9.4±0.2) mA/M

SWCNTs can measure H_2S concentrations from 8 μM to 60 μM, with a LD of 4.3 μM

SWCNTs-PVA is capable of measuring H_2S from 52 μM to 512 μM, with a LD of 34 μM

Universitat Autònoma de Barcelona

Centro Nacional de Microelectrónica CSIC

CSIC Consejo Superior de Investigaciones Científicas

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Thank you for your attention

Research Group on Biological Treatment and Valorisation of Liquid and Gaseous Effluents
ENOCOV

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GAB
Biomedical Applications Group