Development of a sensor to detect micro and nanoplastics in the environment

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THE PROBLEM

Production of plastics

Disposal in the environment

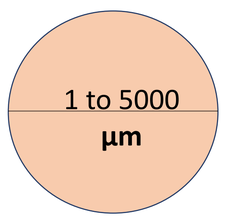
Accumulation and degradation

Animal ingestion

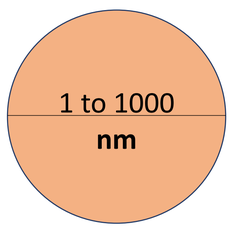
Human ingestion??

STATE OF THE ART

MICROPLASTICS



NANOPLASTICS



Main steps in current detection methods:

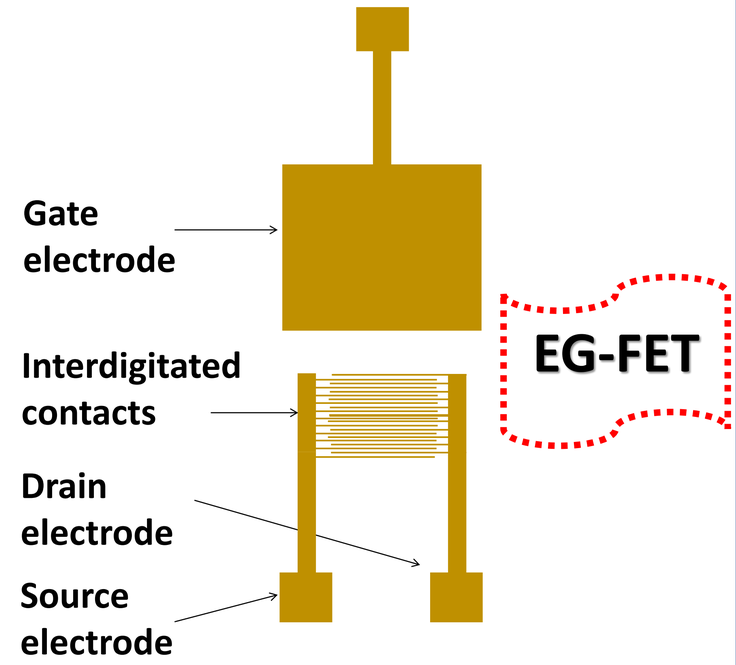
Pretreatment

Imaging

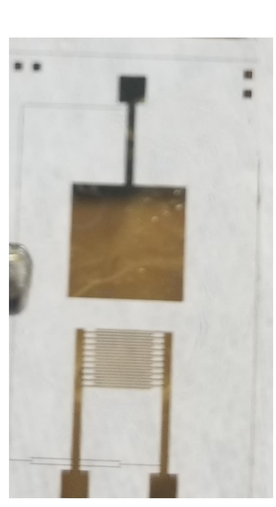
Quantification

Development of an Electrolyte-gated Field-effect-transistor (EG-FET) to be used as biosensor for microplastics detection

PROPOSED DEVICE



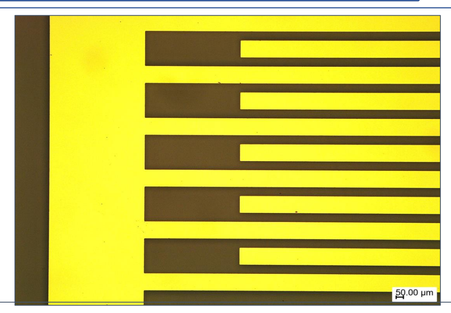
Picture of the fabricated device



PRELIMINARY RESULTS

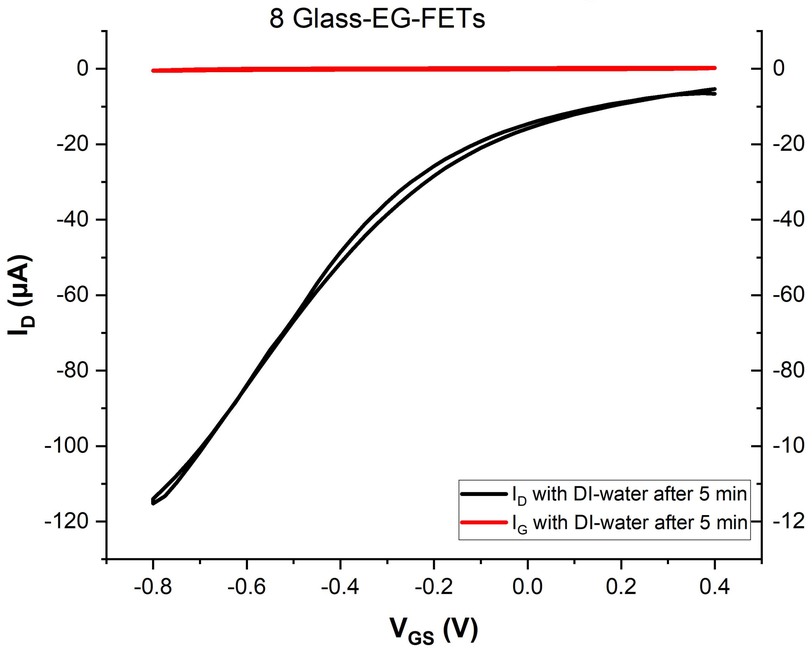
Optimization of EG-FETs on glass:

- Microfabrication process developed (photolithography with mask aligner, Cr/Au evaporation, metal lift-off, CNTs spraying)
- Devices tested with DI-water to study their behavior – electrical characterization performed

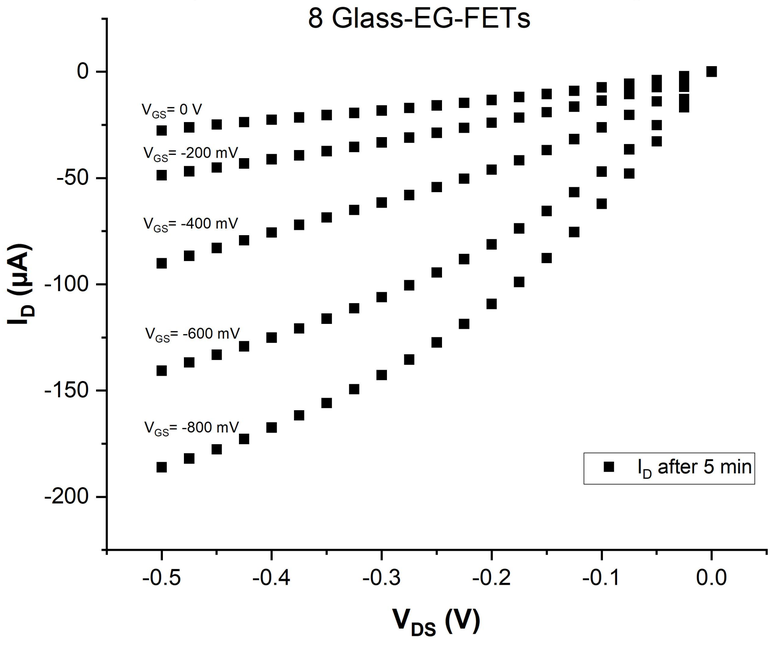


Picture taken at optical microscope after evaporation and lift-off in acetone. Gold is present only in the wanted structure.

Transfer curve obtained from the average of 8 Glass-EG-FETs

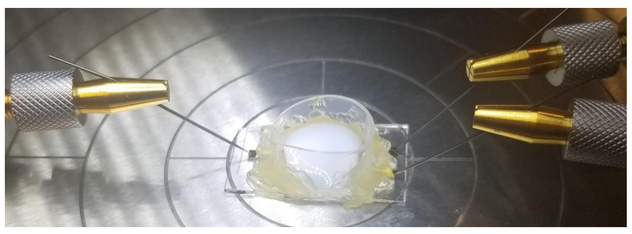


Output curves obtained from the average of 8 Glass-EG-FETs



CURRENT and FUTURE WORK

- ❑Test the devices with micro and nanoplastics solutions



- ❑Find a biorecognition element specific for one type of micro(nano)plastic
- ❑Optimize the device in order for it to recognize the specific analyte

Acknowledgments

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References

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