

Results of the Project

"Innovative Zeolite/Graphene Electrodes on Stone Paper for Pesticide Detection in Fruits and Vegetables" (acronym SMARTSENS)- Website: <https://www.itim-cj.ro/PNCIDI/smartsens/>

Project No. TE 153 / 2022, Project Code PN-III-P1-1.1-TE-2021-0358

Summary of Stage 1 (June 2022- December 2022)

The stage encompassed 3 activities, summarized below:

1. Reactor Design and Graphene Synthesis:

- Designed and built a reactor for producing graphenes via electrochemical exfoliation assisted by electrical discharge (plasma).
- Synthesized Gr-1, Gr-2, and Gr-3 graphenes using this method, optimizing synthesis conditions (electrolyte method, electrolyte concentration).
- Decorated graphenes with cobalt nanoparticles (Gr-Co-1 and Gr-Co-2) and optimized synthesis conditions.

2. Graphene's Characterization:

- Morpho structural characterization of the synthesized graphenes using advanced techniques: transmission electron microscopy (TEM), scanning electron microscopy (SEM), FTIR spectroscopy, XRD, and UV-VIS spectroscopy.

3. Zeolite Synthesis:

- Synthesized zeolites Z1, Z2, and Z3 using solvothermal methods and optimized synthesis conditions (reactants, drying temperature).
- Modified zeolites with cobalt nanoparticles (Z-Co) via ion exchange of Na^+ with Co^{2+} .
- Characterized the zeolites morphologically using TEM and SEM.
- Determined the specific surface area and porosity using Brunauer-Emmett-Teller (BET) technique.

Results: - One ISI article.

- Two international conference participations.
- Four products: Gr-1, Gr-2, Gr-3 graphenes, and cobalt nanoparticle-decorated graphene (Gr-Co); Z1, Z2, Z3 zeolites, and cobalt nanoparticle-modified zeolite (Z-Co).
- One experimental model: reactor for graphene production.

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