Loïc VOISIN

Research Engineer (2025-2026)
LGP2 (A. Denneulin)
LEGI (F. Ayela)

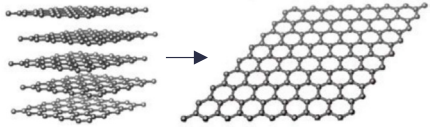
Green Graphene: Development and industrialization of graphene dispersion processes in various matrices and optimization of its production by microfluidic cavitation

Développement et industrialisation de procédés de dispersion du graphène dans diverses matrices et optimisation de sa production par cavitation micro-fluidique

FunPrint

Context

LEGI : Patented microfluidic on a chip exfoliation process producing high-quality graphene nano-sheets



graphite *graphene*

- Graphene nanoplatelets suspension
  - Thickness <5 nm
  - Lateral size 150-250 nm
  - Concentration 1 to 5 g/L

LGP2 : expertise in complex fluid formulation, nanomaterial dispersion in liquids & polymers, bio-based materials (e.g., nanocellulose)

- Need to develop processes for dispersing graphene in various aqueous, solvent or nanocellulose matrices

Funded by / In collaboration with:

UGA Université Grenoble Alpes
Linksium technology transfer & startup building Grenoble Alpes
LEGI LABORATOIRE DES ECOULEMENTS GEOPHYSIQUES ET INDUSTRIELS
MADCAP NANO

Objectives

- Mastering the **exfoliation process** and modification of pilot line to increase production and productivity
- Production of **more concentrated solutions** using various chemical or physical techniques (20 to 50 g/L)
- To the **formulation of graphene-enriched complex fluid** (aqueous, solvent-based, deposits, Epoxy) in large quantities and at competitive prices

Working with the start-up:

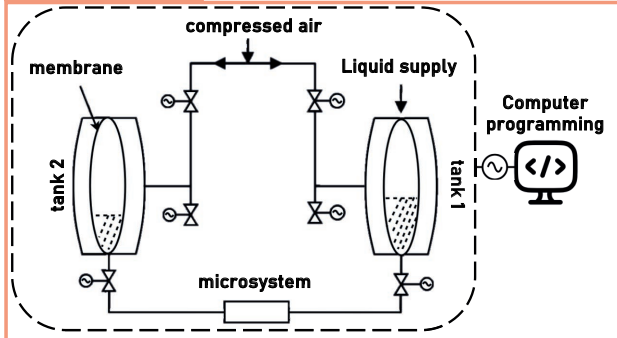
MADCAP NANO
Microfluidic Advanced Cavitation Processes

Applications:

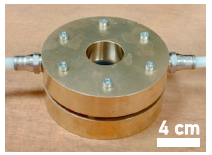
- Conductive inks for printed electronics
- Additives for anti-corrosion, lubricant coatings or anti-abrasion surface treatment

➢ **alternative to the PFAS**

Methods

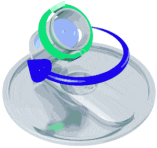


Complete flow loop with solenoid valves to achieve cost-effective & eco-friendly exfoliation of graphite by microfluidic cavitation [1]



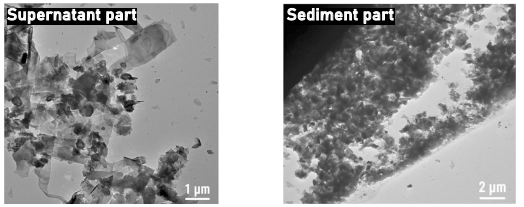
Microsystem

Centrifuge



SpeedMixer

Characterization:
UV Vis, TGA, SEM, AFM, TEM



TEM snapshots of centrifuged graphenofluid [2]

[1] X. Qiu, 'Procédé d'exfoliation du graphite en phase liquide dans des laboratoires sur puce', phdthesis, Université Grenoble Alpes, 2018. / [2] S. Ponomareva and F. Ayela, 'Anticorrosion and lubricating properties of an aqueous graphene-based nanofluid', Appl. Phys. A, vol. 129, no. 1, p. 18, Dec. 2022