Development of sustainable water-based multifunctional nanofluid with xanthan gum (XG) and graphene oxide (GO)

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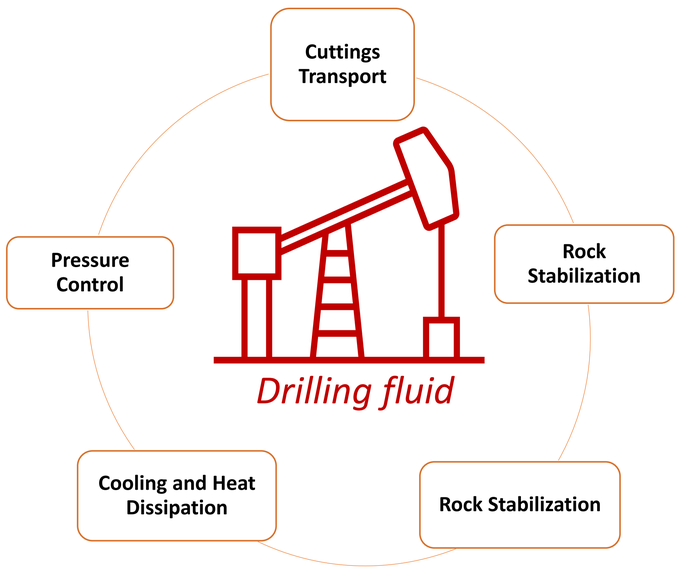
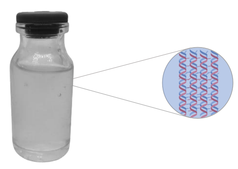
Motivation

To address the growing oil demand and challenges in onshore extraction, ultra-deep water exploration becomes crucial. However, this exploration faces obstacles such as drilling through salt formations and tackling environmental concerns.

- Essential for underground resource extraction;
- Adaptable composition for various operations;
- Contributes to operational efficiency and safety.

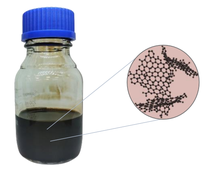


Nanomaterials



Xanthan Gum (XG)

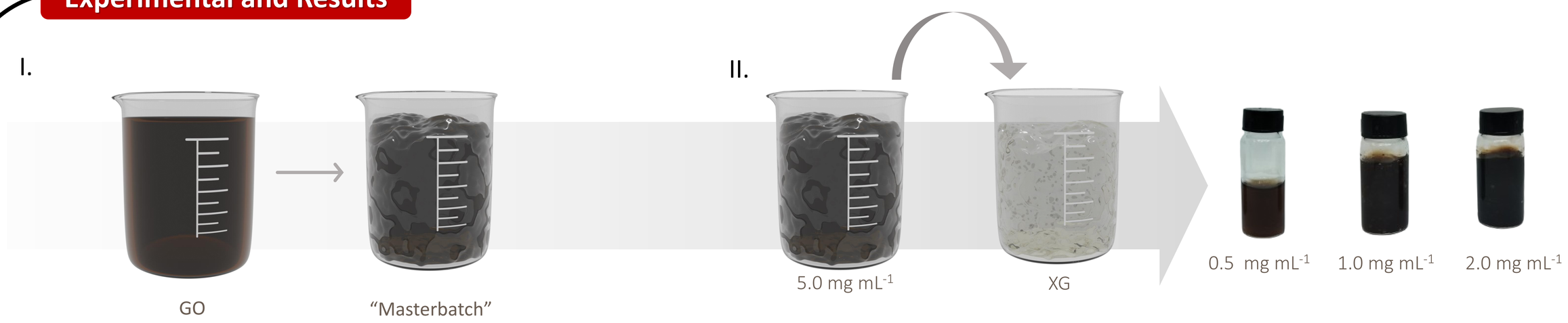
- Exhibits degradation at high temperatures;
- Natural polysaccharide;
- Enhanced viscosity.



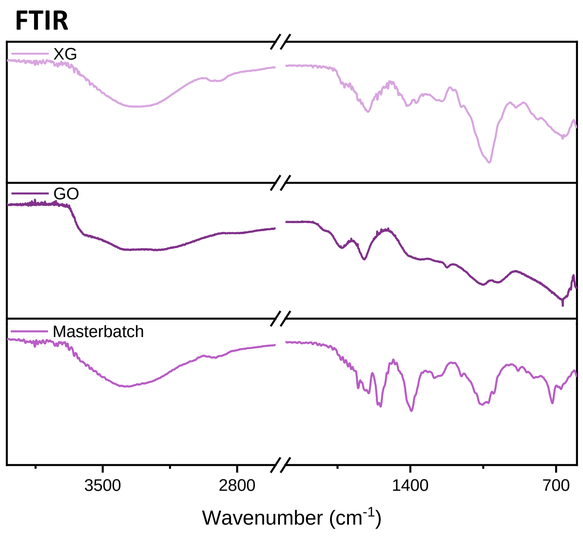
Graphene Oxide (GO)

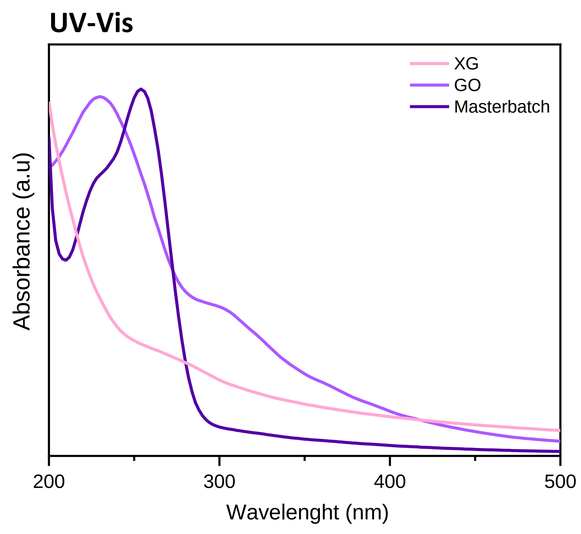
- Derived from graphene, with oxygenated groups;
- Hydrophilic, water dispersable;
- Improving fluid circulation.

Experimental and Results

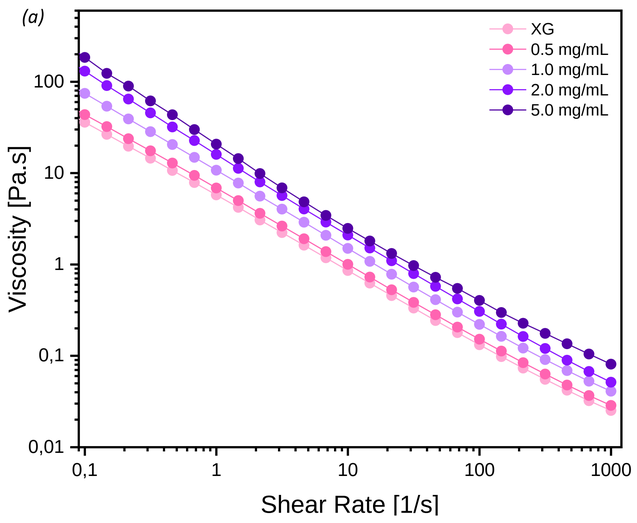


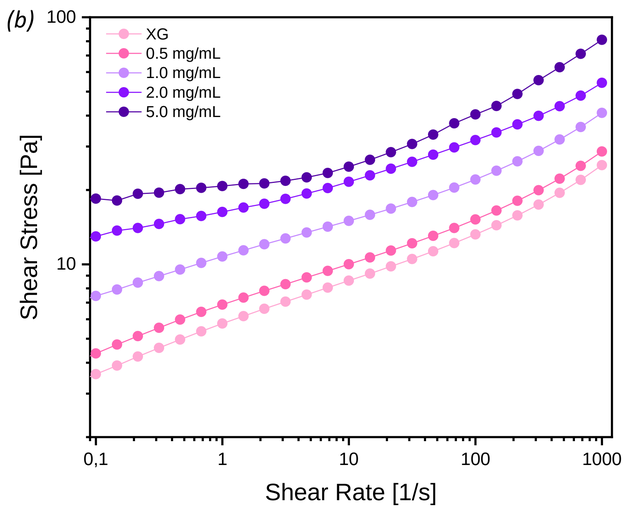
Structural characterizations





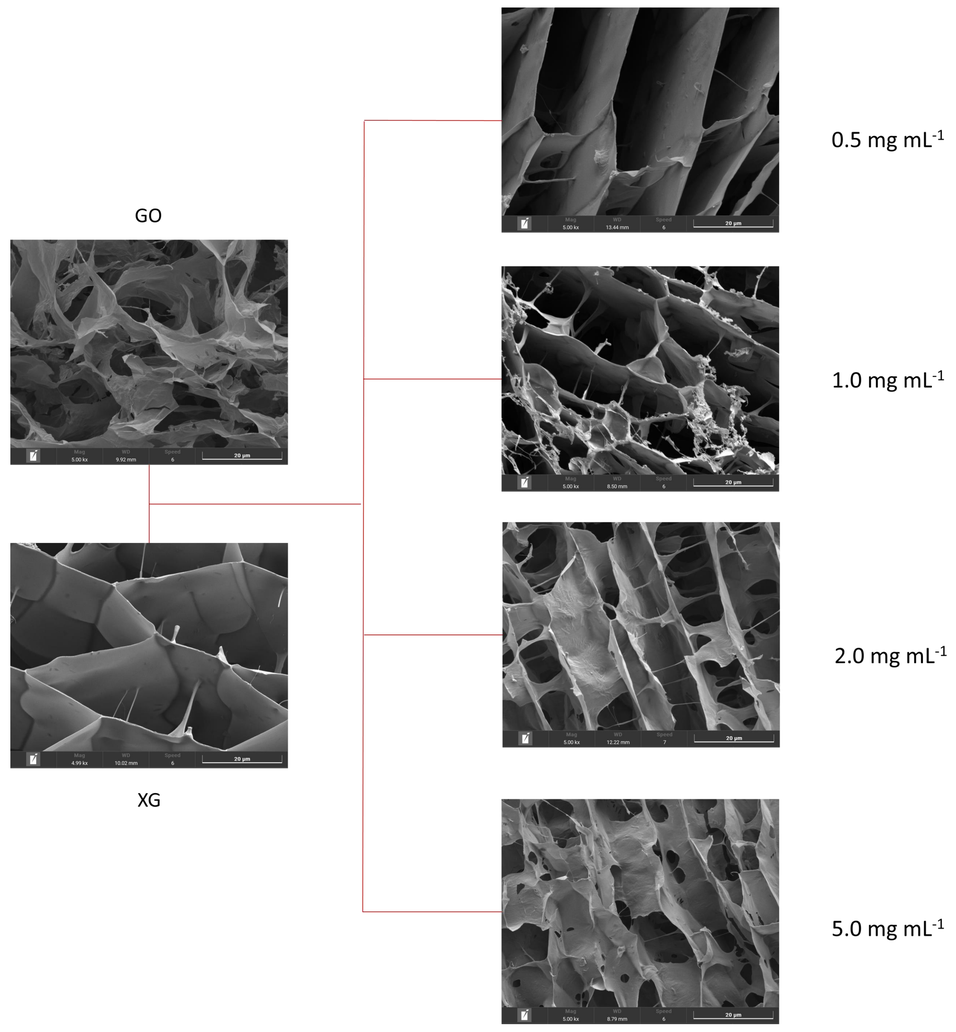
Rheological measurements





Flow curves of various concentrations of GO (a) viscosity x shear rate and (b) shear stress x shear rate

Cryo - SEM



Conclusions

- A multifunctional nanofluid was obtained by a simple process;
- The dispersions are homogeneous and stable;
- GO increases the viscosity of the matrix, improving the material;
- Tests are needed for a better understanding of the interactions involved;
- Possibility of applying the nanofluid in other areas.

Acknowledgements

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