

*Electronic Supplementary Information*

Pickering emulsion-templated synthesis of 3D hollow graphene as an efficient oil absorbent

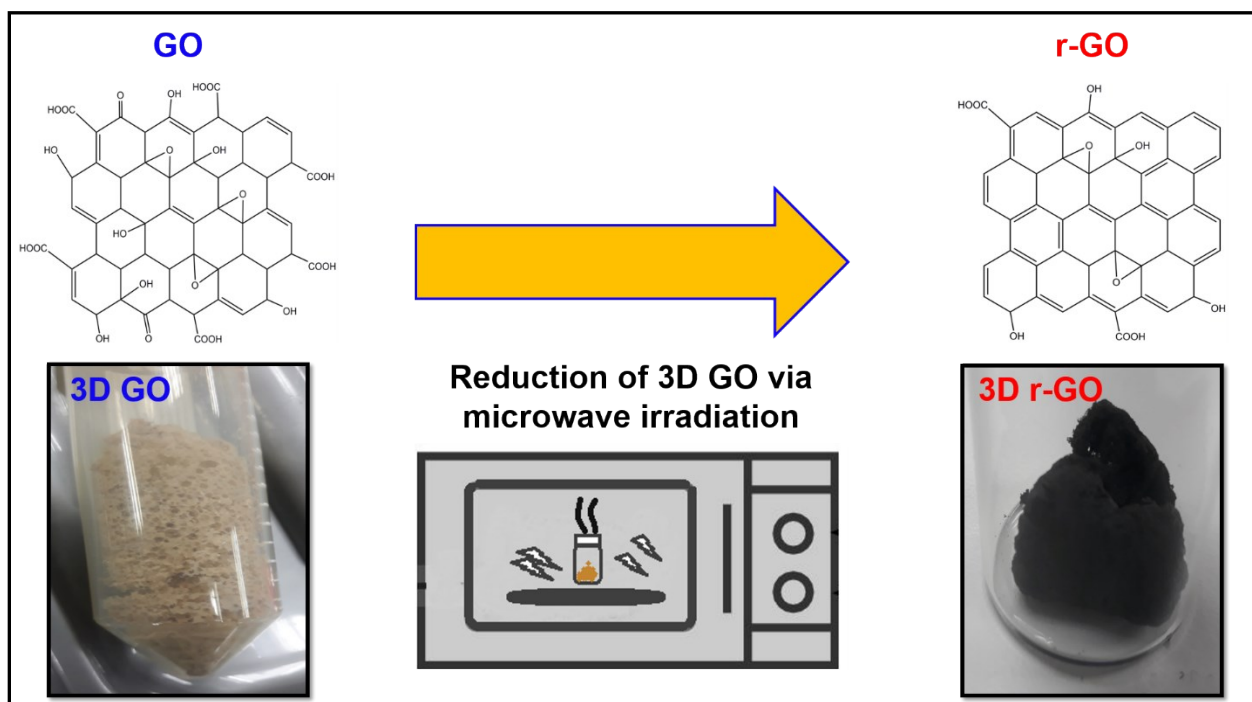
Nurul Aqilah Pohan,<sup>1</sup> Mohd Haniff Wahid,\*<sup>1</sup> Zulkarnain Zainal<sup>1,2</sup> and Nor Azowa Ibrahim<sup>1</sup>

<sup>1</sup>*Department of Chemistry, Faculty of Science, Universiti Putra Malaysia, 43600 Serdang, Selangor, Malaysia.*

<sup>2</sup>*Material Synthesis Laboratory, Institute of Advanced Technology, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.*

\*Email: [mw\\_haniff@upm.edu.my](mailto:mw_haniff@upm.edu.my)

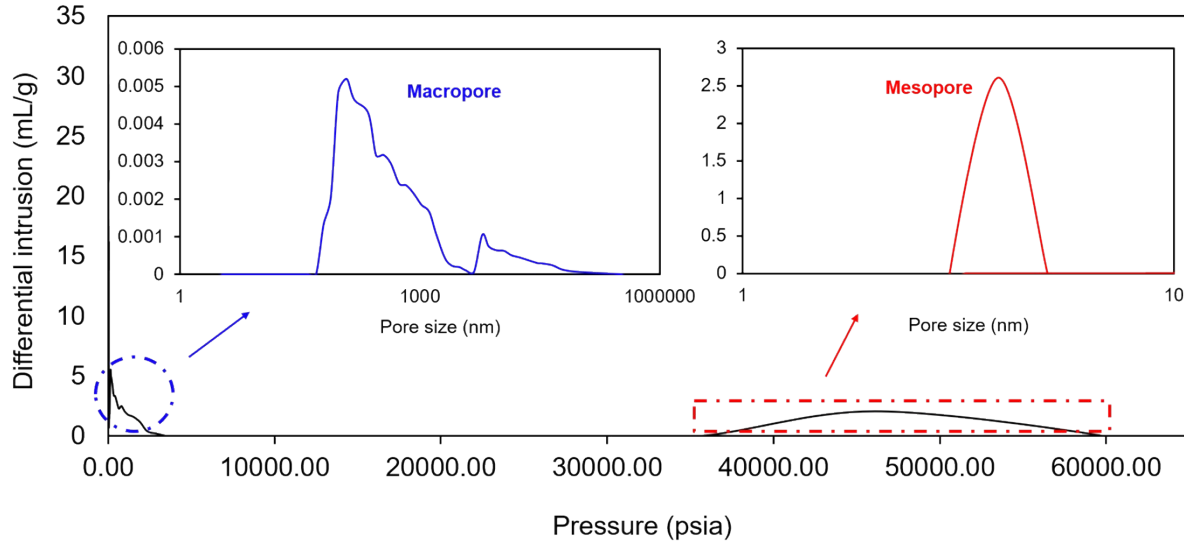
**S1 Schematic illustration of the microwave reduction of 3D GO**



**Figure S1** Schematic illustration of the microwave reduction of 3D GO

Schematic illustration of the reduction of 3D GO via microwave irradiation is as shown in Figure S6. The reduction process was carried out at standard atmospheric pressure and irradiation time was fixed at 30 minutes whilst the temperatures were varied i.e., 120 °C, 150 °C and 170 °C.

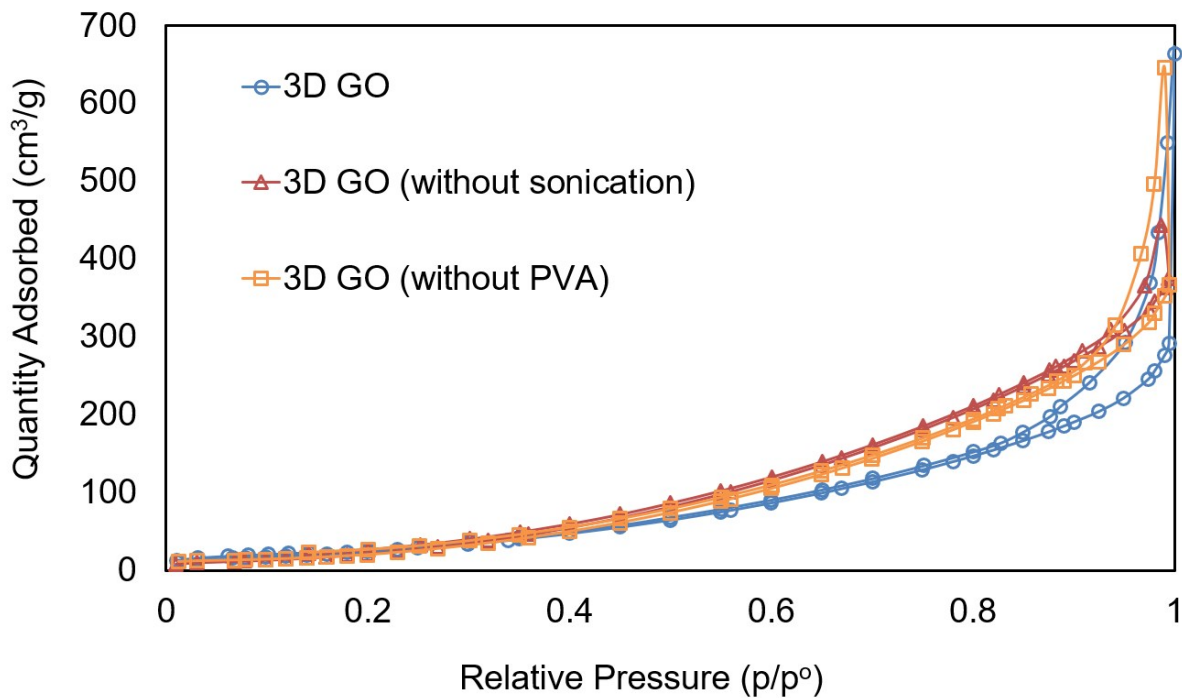
## S2 MIP of 3D r-GO



**Figure S2** MIP analysis result of 3D r-GO. Inset images shows plot of differential intrusion vs pore size

MIP analysis reveals the presence of large number of macropores and mesopores of 3D r-GO which facilitates the diffusion of oil in the pores.

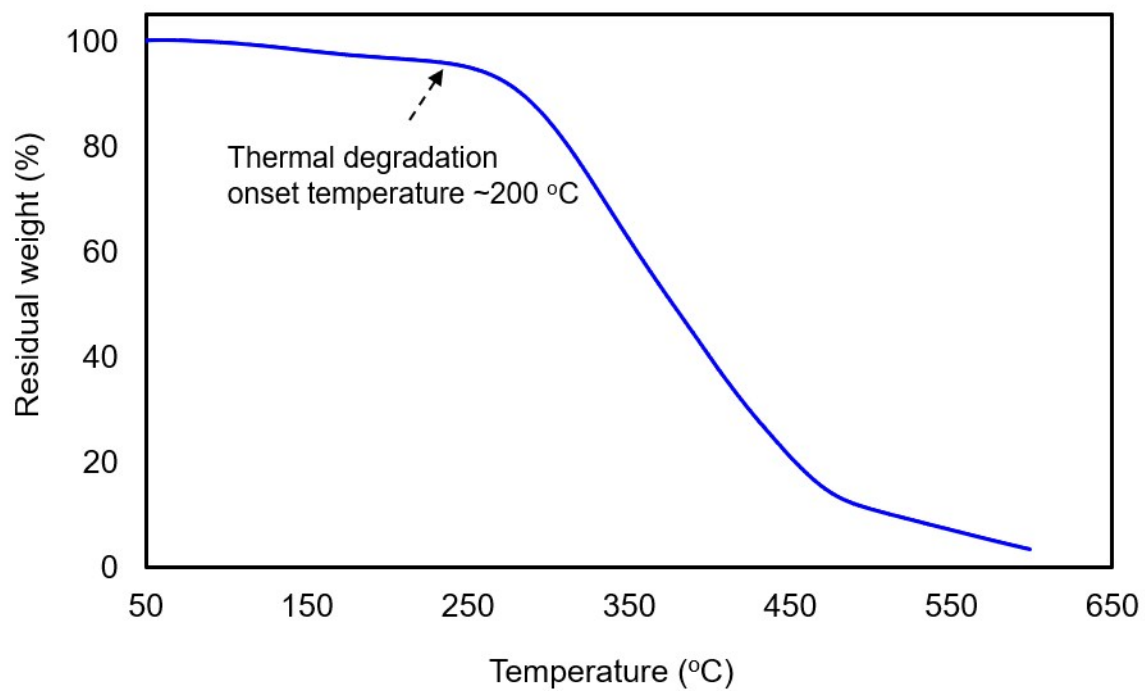
**S3 BET isotherm of 3D GO at different formulation**



**Figure S3** BET isotherms of 3D GO without sonication and in absence of PVA.

The isotherm for 3D GO without sonication shows smaller hysteresis loop as compared to 3D GO prepared with sonication and prepared without PVA.

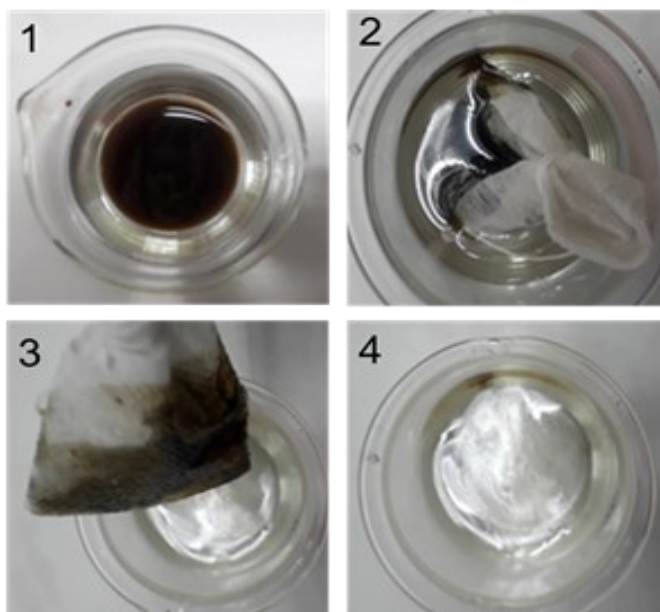
#### S4 TGA of PVA



**Figure S4** TGA thermogram of pure PVA

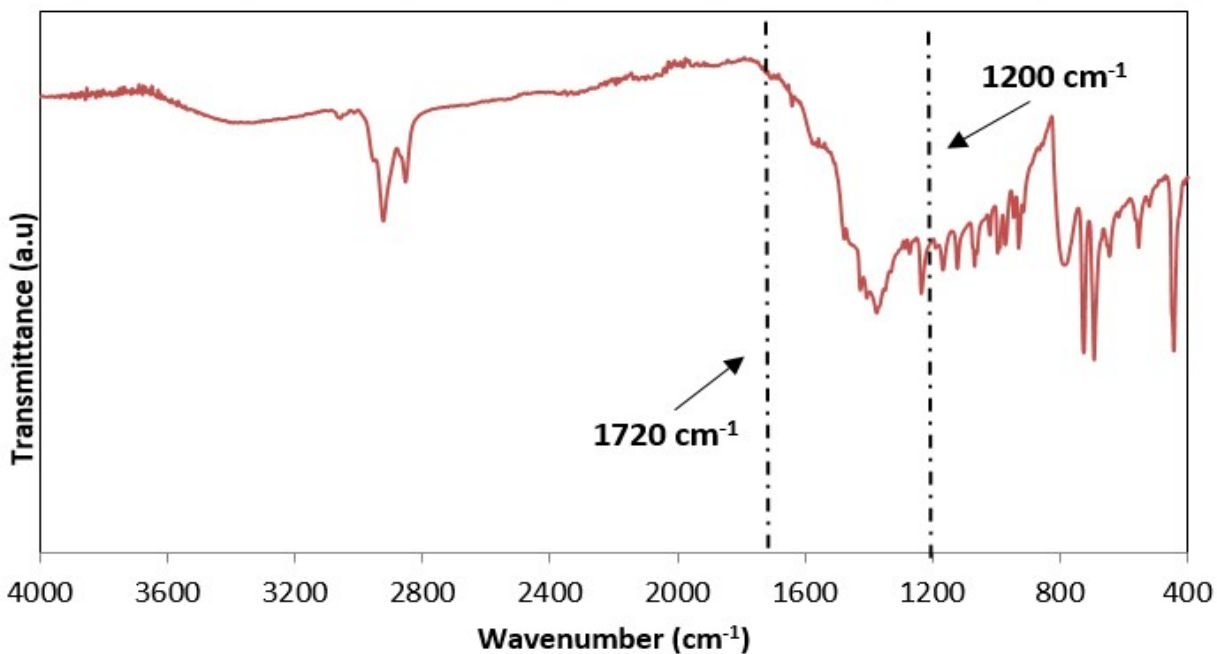
TGA thermogram of PVA featuring 4% weight loss starting from ~194 °C attributed to loss of oxygen functional groups.

**S5 Simulation real application of oil spill in water surfaces.**

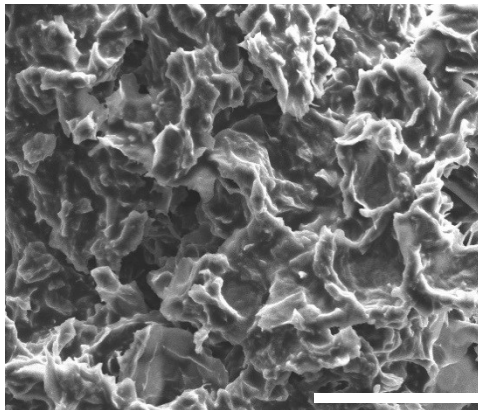


**Figure S5** 3D r-GO (50 mg) sorption experiment using teabag casing to remove used engine oil from water surfaces.

**S6 3D r-GO after oil recovery using *n*-hexane oil extraction method**



**Figure S6 (a)** FTIR of 3D r-GO after oil extraction with *n*-hexane.



**Figure S6 (b)** SEM image of 3D r-GO after oil extraction with *n*-hexane (scale bar: 40  $\mu\text{m}$ )

The SEM images of 3D r-GO shows the disintegration of 3D network of PVA/GO and a paper-like structure was observed instead of an interconnected framework.