Formulating Functional Films and Coatings III

FUNCTIONAL REDUCED GRAPHENE COATING FOR AUGMENTING THE RATE OF **CLEAN WATER GENERATION USING SOLAR ENERGY**

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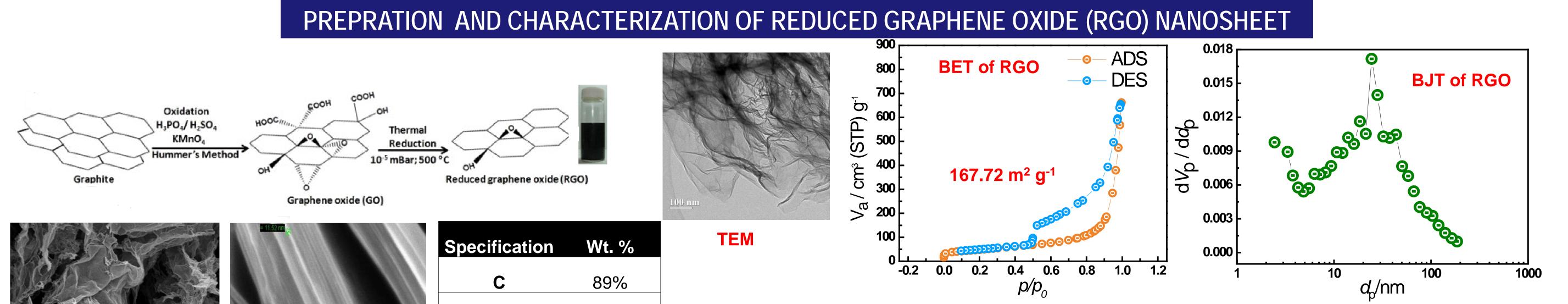
- * 97 % of the total available water resource is saline and only 2.6 % is freshwater resources and out of this, only 1 % can be accessible by mankind for different applications.
- Tremendous industrial growth and urbanization have exploited the fresh water resource extensively and scarcity of fresh water will be even worst in the upcoming years. Among all the continents, Asia is the highest water consumer and it consumes around 2780 billion m³ / year water. In these regards, there is a strong need to explore the alternate opportunity to fulfill the global demand for fresh water.
- **Solar desalination system** has enormous potential to fulfill the **global freshwater demand** in economic and environment friendly manner

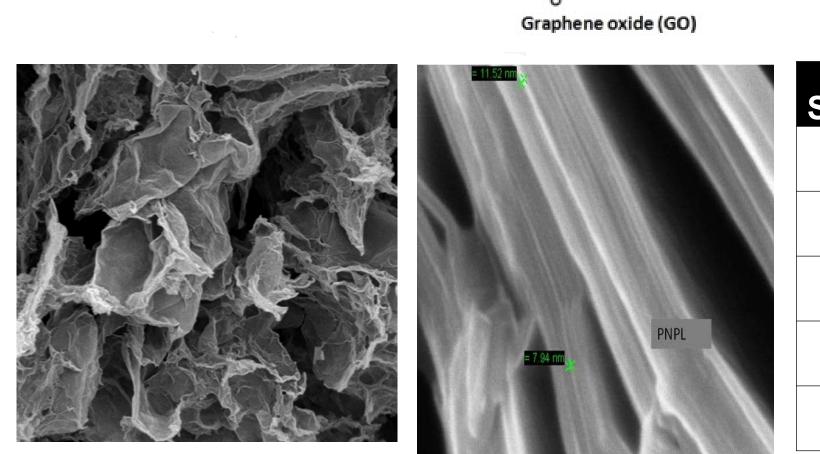
9%

2 %

< 1 %

Solar still can be an appropriate solution for potable water problem





SEM image of RGO Nanosheet

□ SEM shows the porous and wrinkled structure of RGO, due to the hydrothermal treatment. The homogeneous distribution of macropores is observed in well-connected ultrathin RGO. 0.04 %

The pore size distribution for the RGO indicates the existence of hierarchical porous feature with total pore volume of 0.9 cm³ g⁻¹ and mean pore diameter 22 nm. The large pore size was up to 70 nm. **XRD of RGO Nanosheet**

PREPRATION OF RGO PAINT AND EXPERIMENTAL SETUP

> RGO is taken in the weight ratio of 2 and 4 %. Black oil paint and turpentine (4:1) along with RGO was mixed

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> Solution of RGO with black paint was stirred: 300 rpm, 1h for achieving black nano-paint

> Nanopaint coating- Spray gun (High volume, LP)



✤Gun nozzle: 1.4 mm

✤Air Consumption : 6 CFM

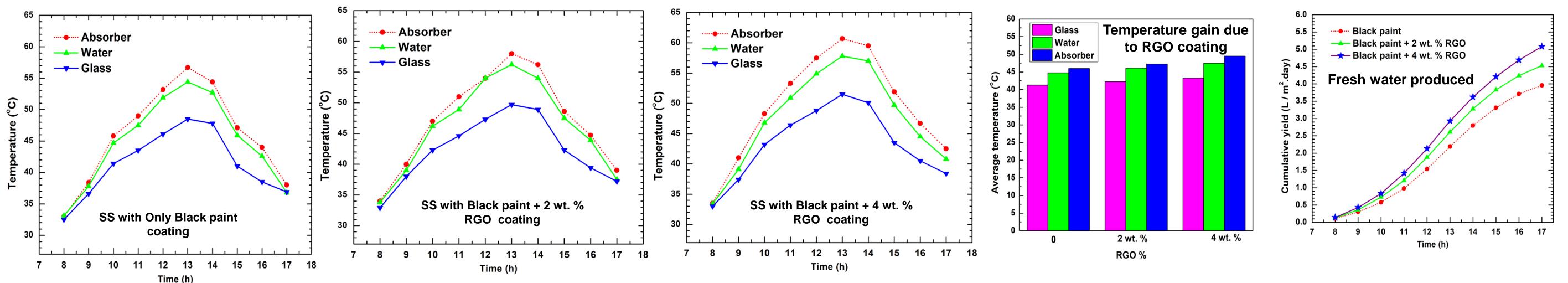
♦ Sand paper : 220 – grit

Drying Hour : 4 h



EFFECT OF RGO COATING

Temperature measurement across the absorber, glass and water in Solar Still



□ Solar radiation was least in the morning, increase steadily throughout the day, and attained a maximum value of 1096 W/m² at 1 PM.

S with only black paint coated Absorber, the peak temperature of the glass, water and absorber was found to be 48.5 °C, 54.4 °C and 56.7 °C, respectively.

U With 2 wt.% RGO, the maximum temperature of the glass, water, and absorber was 49.7 °C, 56.2 °C and 58 °C, respectively.

U With 4 wt.% RGO, the maximum temperature of the glass, water, and absorber was 51.5 °C, 57.8 °C and 60.7 °C, respectively

Large pore size, leads to exceptional increase in absorption of solar radiation by the absorber and owing to the higher thermal conductivity of RGO, all the stored energy in the absorber is effectively transferred into the water at a faster rate.

□ SS with only black paint coated AP shows the full day yield of 3.96 L/m². 2 wt. % and 4 wt. % RGO significantly augmented the yield by 14.4% and 28.3%.