

Attacking Fresh Water Crisis with Waste Materials and Solar Power: Preparation and Electrosorption Desalination Performance of Peanut-shell based Activated Carbon and Defect-rich MoS₂

Bole Pan



Guangzhou Tianhe Foreign Language School, China



Email: jamespan1118@hotmail.com.

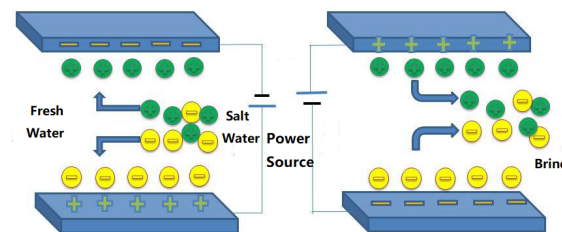
Serious Fresh Water Crisis!

- 4 billion people potentially influenced
- Traditional methods: very EXPENSIVE!

Capacitive Deionization

- Energy saving, low voltage required
- Principle: charge attraction

Goal: Find cheap, obtainable materials with high efficiency



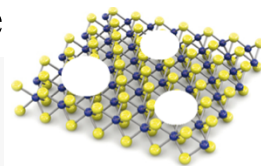
Waste Peanut Shells

- Drought tolerant plant & worldwide distribution
- 10 million tons a year: Normally **burned !!!**
- Turned into carbon electrode

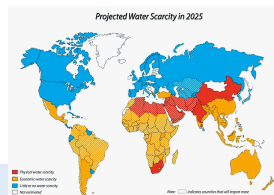
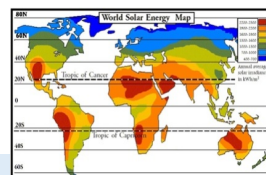


MoS₂

- 2D material (like graphene)
- Large surface area -- high capacitance

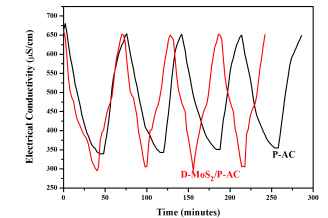
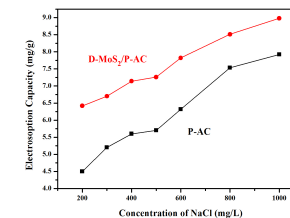


Solar Power



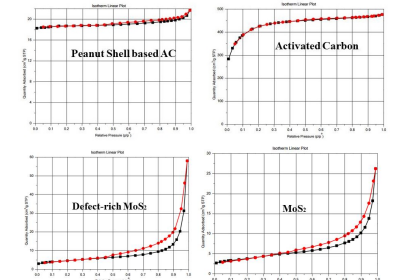
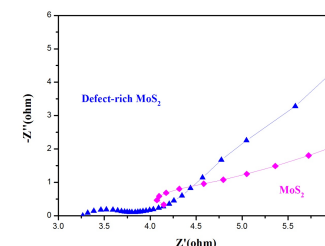
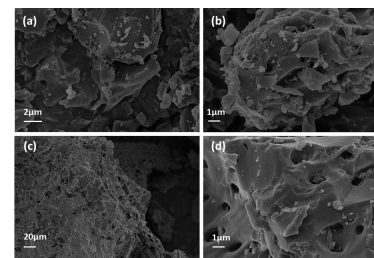
Lab Tests Results

- Capacity: 8.98 mg/g
- Good reusability



Analysis through characterizations

- Peanut shell based AC: larger pore width
- MoS₂: large surface area, easy for ions to approach



Practicality:

Automated, Solar-powered Desalination System & Tests with real sea water

Result: 200mL, 9-cycles, TDS: 17 to 0.2g/L

