Carbon Power

An invention for the preparation of semi-permeable membranes which can be used as pressure-retarded osmosis membranes in salinity power generation.

The feasibility of using these was tested using an osmosis test rig where the hydrostatic pressures generated from the test-rig were compared for each type of membrane. The environmental stability was also tested by investigating any damage caused to the membranes. In addition the conductivities of the samples were measured to be in the range 0.001 – 0.32S.

The morphology and pore size of the membranes was investigated by Scanning Electron Microscope (SEM) and the porosity of the membranes was measured using Archimedes principal. The porosity of the CNT and graphene bucky papers varied from 5% to 19%, with pore sizes between 18 nm and 2 um. The cellulose acetate/CNT composite membranes had pore sizes of about 80 – 100 nm and about 90% porosity.

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CARBOPOWER

An invention for the preparation of semi-permeable membranes which can be used as pressure-retarded osmosis membranes in salinity power generation.

Technology Overview:

Researchers at Trinity College Dublin have developed several types of membranes fabricated using Carbon nanotubes (CNT), graphene sheets (bucky papers) and/or CNT / cellulose acetate composites for use in salinity power generation.

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Advantages:

- CNT membranes are chemically inert and have high thermal stability.
- Energy created by Pressure Retarded Osmosis is renewable with limited impact on the environment - no CO_2 emissions, toxic emissions or fuel costs.
- Commercially available membranes are highly water permeable and highly salt permeable.
- Commercial salt permeable membranes tend to clog easily and affect the performance of the system. Conductive membranes as developed can utilize their inherent conductivity as a means to remove this clogging or build up of bio-film.
- Molecular simulations have indicated that carbon nanotube membranes are about 10,000 times more efficient than the commercially available synthetic membranes
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Development Stage:

Proof of concept has been proven. Further development is required to bring this product to market.

Principal Inventors:

Prof. Werner Blau, Dr. P. Ramesh Babu and Dr Anna Drury- all from the School of Physics.

Patent:

A priority patent application was filed in Oct 2009.

Trinity College Ref: WB01-178-01

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