Crosslinked Membranes for Natural Gas Purification

Membrane technology that achieves better gas purity by reducing membrane plasticization

Researchers at the Georgia Institute of Technology have developed membrane compositions that reduce the effects carbon dioxide-based, swelling-induced plasticization. Membranes are relatively simple devices that can act effectively as “molecular filters” for gas molecules. However, strongly sorbing species, such as carbon dioxide, swell polymer membranes and cause “plasticization” of the membrane, thereby undermining the separation efficiency of the membrane. The innovative membrane is comprised of thermally crosslinked polymeric compositions that show high carbon dioxide permeability and selectivity and reduce plasticization.

Summary Bullets

- **Better separation -** achieved better CO_2/CH_4 separation than commercial polyimide membranes
- **Cheaper**
- **Versatile in production -** crosslinking can be done in various chemical means depending on application demands and still result in plasticization resistance and improved gas separation performance

Solution Advantages

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Potential Commercial Applications

- Recovery and recycling of carbon dioxide in enhanced oil/gas recovery
- Recovery of methane from landfills and biogas
- Recovery of carbon dioxide from flue gases.
- Separation and purification of gases

Background and More Information

The United States produces about 20 trillion scf/year of natural gas that generates more than $100 billion annually in sales, with worldwide consumption expected to increase 92% by 2030. However, nearly all natural gas requires some type of treatment to reduce contaminants. The most abundant contaminant, carbon dioxide (CO_2), has typical concentrations between 5-25 mol %, while some reservoirs contain levels even above 50%. In order to meet pipeline specifications for transport and to minimize pipeline corrosion, the carbon dioxide concentration must be reduced to less than about 2%. Removing CO_2 via membrane-based separation processes offers an attractive alternative to traditional absorption processes due to the relatively low capital and operational costs, portability, scalability, and environmental security.

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IP Status

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Publications

Koros Group - Membrane & Sorbent Research O, -

Images

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