Recyclable Membranes for Size-Selective Separation of Nanoparticles (Yeda)

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Summary

A new recyclable size-selective filtration device.Particle size, chemical purity and dispersion of nanoparticles crucially determine their optical, electronic and chemical properties. Size-selective separation technologies are becoming increasingly important for the development of nanoparticles with well-defined sizes, which have application in the fields of optoelectronic devices, biomedicine, materials, and catalysis. Researchers at the Weizmann Institute have fabricated supramolecular ultrafiltration membranes that can be used for filtration and size-selective chromatography of nanoparticles. The membranes are composed of a self-assembled three-dimensional fibrous network that is held together by reversible non-covalent interactions.The membranes are robust, easy to fabricate, and recyclable.

Applications

Size-selective separation of semiconductor and metal nanoparticles
Uniformity and monodispersity of nanoparticles in solution.
Size exclusion chromatography of nanoparticles in the sub-5-nm size regime.

Advantages

Efficient and inexpensive
Fast and easy fabrication
Recyclable
Self-assembled
Dual application regime: filtration and/or chromatography

echnology's Essence

he recyclable supramolecular membranes are formed from unique perylene derivatives that are large and flat romatic molecules. These molecules are insoluble in water and form a 3-D network over a solid support, hich can be used for the separation of nanoparticles. The filters can be subsequently recycled from this ixture using an organic solvent (e.g. dichloromethane), which separates the membrane material from the ater-soluble nanoparticles, and reused without loss of performance.This material is hence highly attractive for pplication in the field of nanotechnology.

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