

Separation/Purification/Collection Technologies in Molecular Scale based on Nanostructures and Nano Devices

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- ⇒ This technology can realize a nanostructure with uniform pores with a simple, inexpensive fabrication process using porous structures formed by stacking nanoparticles
- ⇒ This technology enables advanced functional nanopores or nanochannels with electric or chemical characteristics by surface treatment on the polymer nanoparticles.
- ⇒ These nanostructures are expected to provide new methods for efficient separation or collection of ionic or molecular substances.
- ⇒ This technology is also believed to provide advanced fabrication techniques for nanostructures, which have been difficult or expensive with conventional technologies so far.

Client / Market

- Pharmaceutical, bio devices that require selective transfer of molecules or ions
- Selective collection of bio substance that cannot be collected/detected through conventional membrane High sensitive micro sensors

Necessity of this Technology

- Conventional process technologies such as ion beam and laser-assisted fabrication for nanochannels usually require large and expensive equipments. Furthermore, those techniques cannot be used for large area and mass production.
- A method using synthesis of nanomaterials accompanies complicated processes and is not suitable for modulation of the structures.
- With this technology, multiple nanochannels can be processed consistently and simultaneously on a specific area, thus the fabrication can be cost-effective and industry-friendly.

Technical Differentiation

- This nanostructure can be used as fundamental platform for water purification, separation of harmful substances, collection of rare substances and biosensors.
- This technology can provide nanostructures on large area, so that this can be applied to purification or desalination of water in small scale, micro sensors for harmful substances in molecular scale.

DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

Other



TECHNOLOGY READINESS LEVEL [TRL]

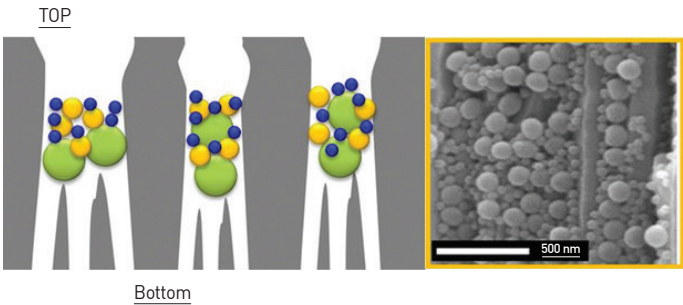
- Research, basic explanation
- Project concept or idea development
- Technology idea verification
- Prototype development
- Trial product production/evaluation in similar environment
- Pilot field demonstration
- Development and optimization of commercial model
- Commercial product demonstration
- Mass production and initial market launch

- It can also be applied to a collecting system for rare metals in ocean and a diagnostic system for DNA and specific proteins.
- Other various applications are possible by changing the materials of the nanoparticles or the methods of surface treatment.

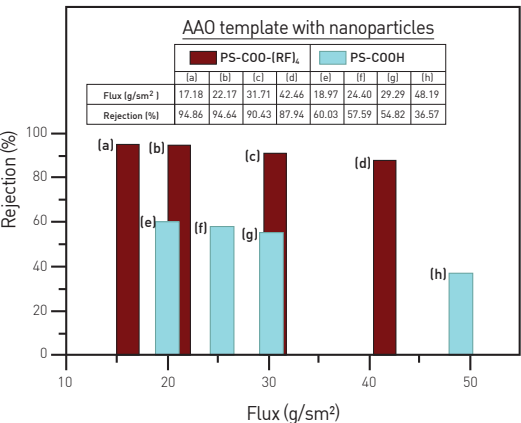
Excellence of Technology

- Further studies have shown that the effective size of the nanopores could be modulated by changing the size of the nanoparticles and surface treatments, which means that the optimum nanopores can be made for specific applications.
- Methylene blue molecules have been separated with this technology experimentally. Test results show that 96% of the Methylene blue molecules have been rejected with extremely high permeability, 160 kg/m²/hr/bar.
- In the future, it can be used as a customized device platform to fulfill a specific purpose through various material and surface treatment process.

Nanoparticle-based Nanostructure Outline (Left) and Cross Section (Right)



Polar Dye Molecule Separation Experiment Result



Current Intellectual Property Right Status

PATENT

- Method of Manufacturing Nano Hole and Filter Manufactured by the Same (KR1605632, EP2995368, SG10201500789X)