



Polymer Microcapsules for Improved Chromatographic Separations

OTT1903

Applications

Identifying rare earth metals is important for applications such as environmental monitoring, nuclear medicine, nuclear forensics, and efficient rare earth element processing, where accurate detection ensures safety, traceability, and optimal resource use.

Target Problems

Separating and identifying metals, particularly rare earth elements, remains a complex and resource-intensive challenge. Many existing separation materials lack selectivity and efficiency, making it difficult to distinguish between chemically similar ions. This leads to longer processing times, increased operational costs, and less reliable analytical results.

Solution

UWM researchers have developed a microcapsule-based material system that helps laboratories and processing facilities that want faster, more accurate metal separations by enhancing mass transport and improving interactions between target metals and selective chemistries and increasing separation efficiency and reliability—unlike conventional materials that limit transport and produce slower, less distinct results.

Key Benefits

- **Up to 2× greater efficiency** than existing materials
- **Better separation** of similar metals
- **Faster and more reliable** testing
- **Reduced material usage** while maintaining higher performance

About this Technology

This technology utilizes engineered polymer microcapsules with a structured architecture that enhances the transport of metal ions. Each capsule contains a thin, active layer of selective chemistry, allowing metals to interact more efficiently during separation compared to traditional bulk materials. By improving diffusion and maximizing contact between target ions and functional materials, this design overcomes key limitations of conventional systems, namely slow transport and poor selectivity, resulting in faster, more efficient, and more precise separations.

Stage of Development

The technology has been experimentally demonstrated, including synthesis and performance testing of the microcapsule-based materials.

Partnering Opportunity

We seek partners for applications with companies developing or supplying extraction chromatography materials, as well as analytical laboratories and research institutions interested in advanced metal ion separations.

Intellectual Property (IP)

Patent pending. Protected and managed by the UWM Research Foundation.

Lead Inventors

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