

Novel Adsorbents for Li Recovery from Unconventional Sources

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Concerns over CO₂ pollution and fuel cost increase, has raised societal awareness, and as a result, in 2023 the registration of electric cars in U.S. increased to 3,555,900 from 280,300 in 2016. While the demand for Li use is clearly increasing, the domestic supply is scarce, forcing the batteries manufacturers to rely on foreign sources. Rapid development of technologies which enable a renewable/sustainable domestic supply of Li and other critical materials has become a top priority for the U.S. government and technology companies.

Current extraction techniques of Li normally include precipitation, ion-exchange adsorption separation, and/or solvent extraction. These often generate a large volume of hazardous waste. We are developing advanced high surface-area nanofiltration adsorbents functionalized with organic Li traps to safely and efficiently extract Li from uncommon resources. This is accomplished by combining 525's natural biopolymeric electrospinning technologies to obtain high surface-area nanofibrous mats, 525's proven extraction of high molecular weight biopolymers (chitin, cellulose), and ORNL/525's two-time R&D 100 award-winning polymer adsorbent technologies with highly Li-selective ligands. The sorbent technology has been proven reliable for extraction of uranium and vanadium from seawater, but until it can be demonstrated for other metals and minerals at production scales, the efficiency of the sorbents will be limited, and the economics of the production scale will hinder the advancement of innovative technologies.

Maintaining a stable and reliable Li supply needs constant production of recyclable materials/sorbents, and consequently accessibility to low-cost feedstock. Having access to a steady supply of high purity chitin opens the door for scalable, innovative product development. 525 Solutions' technology leads to not only chitin feedstock for Li-selective extractants, but to other high-value chitin products that can be scaled to commercial levels.



Dr. Gurau's interests cover the areas of ionic liquids and green chemistry. After receiving her Ph.D. degree in Chemistry from The University of Alabama, Dr. Gurau worked as a Postdoctoral Research Fellow at QUILL in Belfast (NI) and as an Academic Associate in Green Chemistry at McGill University, Montreal (CA), where she emphasized the importance of translating the academic developed technologies to market, meeting with industrial companies and government representatives. Dr. Gurau is 525 Solutions' CEO and a co-founder of Wyonics LLC, a majority women-owned small business that develops real world solutions for Wyoming and beyond.