

## NANOSTRUCTURED MARSHMALLOW GELS FOR SEPARATIONS

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Xerogels are highly porous solids that can be scalably synthesized with diverse compositions and unique mechanochemical properties (inorganic oxides, organic polymers and hybrids thereof) and thus find wide applicability such as adsorbents, catalysts and catalyst scaffolds, filters for separations and thermal insulators. We have previously developed the design, preparation and demonstration of a process for separations and recovery from mixtures via specific adsorption using high-surface area, flexible silica-based nanostructured gel adsorbents. The xerogel can be manufactured in various form factors such as blocks, strips and sheets. These materials have been demonstrated to have excellent capabilities as a result of the ability to tailor the functional groups and chemistries on the xerogel surface. Examples of ideal applications that employ Argonne's xerogels (US Patent Application 16/228,693) include: (1) hydrophobic gels to selectively adsorb hydrocarbons for efficient oil-water separations; (2) high-affinity adsorbents with near-molecular recognition for removal of bioproducts such as biofuels and bioplastics, as well as inhibitors (e.g., aldehydes) from feedstock and fermentation streams that limit the economics of bioconversion processes; (3) ligand-modified adsorbents can capture metal ions and nanoparticles for precious metals recovery and toxic and radioactive metals sequestration; and (4) personal protective equipment for chemical and other malicious substance threats decontamination when used as a skin wipe or as filters in masks.