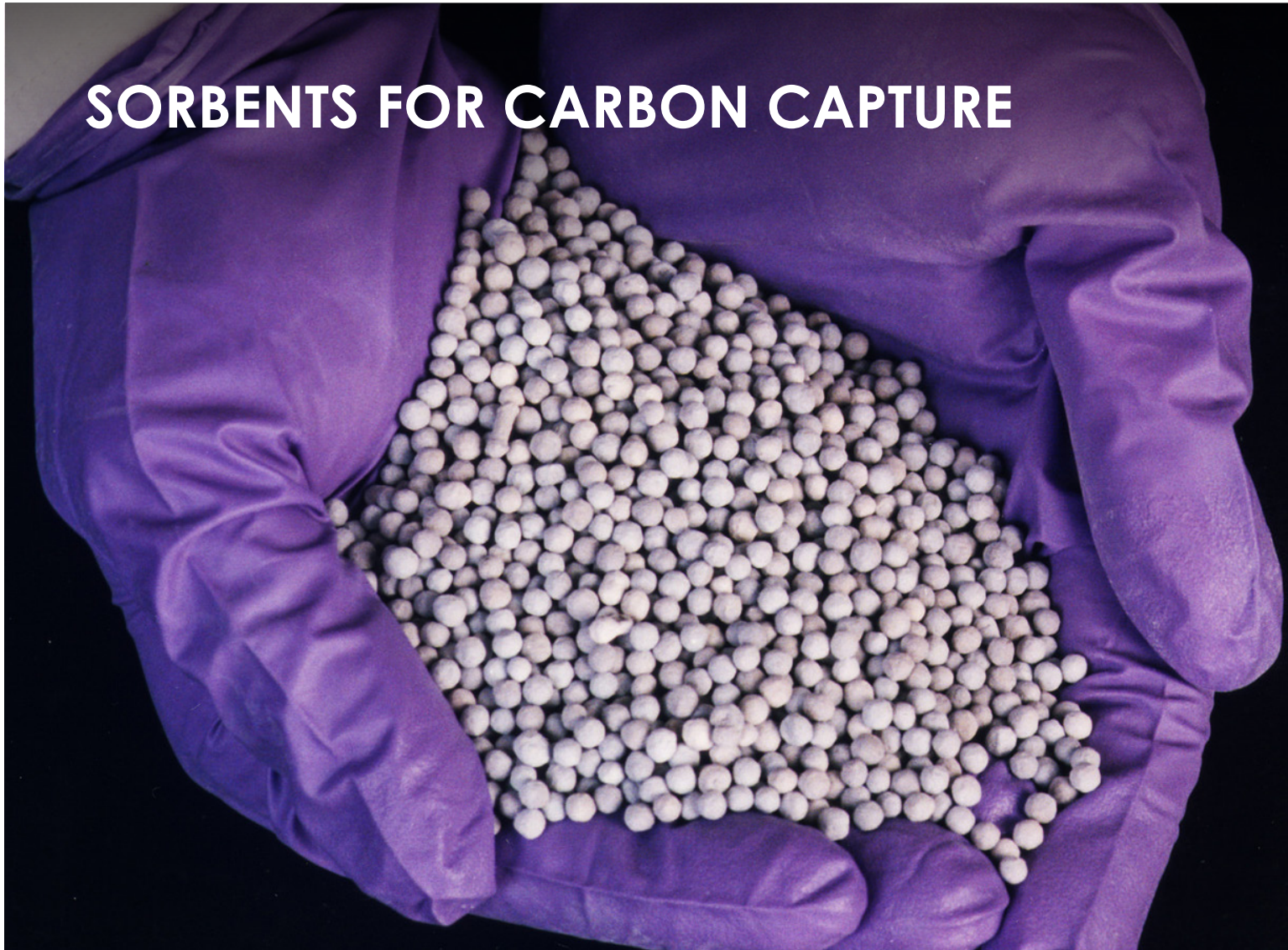


SORBENTS FOR CARBON CAPTURE



NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

Solid sorbents offer the potential for lower regeneration energy, lower corrosion, and lower emissions than solvent-based systems. These advantages enable their use for removing CO₂ at low concentrations in spacecraft and from air prior to cryogenic oxygen separation. Several sorbent classes offer promise for economic CO₂ capture in industrial power plant applications. These classes include: zeolites, silica gels, activated carbons, metal organic frameworks and supported amine sorbents.

Using our nation's resources cleanly and efficiently has long been a central tenet of NETL's mission. As we work to develop and deploy the technologies that will move us into a decarbonized energy future, NETL researchers are also hard at work advancing innovations that are giving new life to our nation's abundant fossil fuel resources. This work is especially important as NETL lends its expertise toward achieving a carbon-free power sector by 2035 and a net-zero economy by 2050 while catalyzing economic revitalization, creating good-paying jobs and supporting workers in energy communities, especially hard-hit coal, oil and gas, and power plant communities across the country.

Sorbent-based CO₂ capture research area within the Carbon Capture Research Portfolio is influencing the discovery of a new generation of sorbents with properties that exhibit improved performance, low-cost, and ease of scale-up in combination with high CO₂ working capacity, high stability, low-pressure drop, and improved heat management. The development of these revolutionary materials guided by advanced computational modeling, process optimization and advanced design will address challenges and pursue potential benefits within and across each of the following three primary platforms:

ADVANCED SORBENT MATERIALS — Expert material scientists, chemists and engineers are using advanced simulation techniques to evaluate thousands of potential sorbent materials. Ideal materials will demonstrate the ability to be manufactured at large scales and enable optimal, stable, low-cost and high-capacity operation.

ADVANCED PROCESS MODELING AND EXPERIMENTATION — Investigations are focused on innovative and radical improvement to current solid sorbent processes (e.g., moving bed, fluidized bed, pressure swing absorption and novel fixed sorbents) with a focus on the creation of advanced solid-gas contacting designs and the development of reactors with less pressure drop, lower attrition rates and better heat management.

ENABLING TECHNOLOGY DEVELOPMENT — Research in this area is identifying and examining a full range of novel approaches to control heat transfer issues, reduce pressure drop, and enhance long-term sorbent reactivity and recyclability.

NETL is a U.S. Department of Energy national laboratory that drives innovation and delivers technological solutions for an environmentally sustainable and prosperous energy future. Through its world-class scientists, engineers and research facilities, NETL is ensuring affordable, abundant and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle, enabling environmental sustainability for all Americans, advancing environmental justice and revitalizing the economies of disadvantaged communities. Leveraging the power of workforce inclusivity and diversity, highly skilled innovators at NETL's research laboratories in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania conduct a broad range of research activities that support DOE's mission to ensure America's security and prosperity by addressing its energy and environmental challenges through transformative science and technology solutions.

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