Advanced Research Projects Agency • ENERGY

IMPACCT PROJECT

TEXAS A&M UNIVERSITY

STIMULI-RESPONSIVE METAL ORGANIC FRAMEWORKS

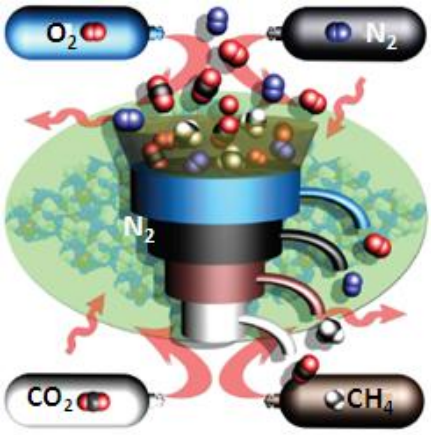
PROJECT TITLE:	Stimuli-Responsive Metal Organic Frameworks for Energy-Efficient Post Combustion Capture		
ORGANIZATION:	Texas Agricultural & Mechanical University (Texas A&M)	LOCATION:	College Station, TX
PROGRAM:	IMPACCT	ARPA-E AWARD:	$1,019,874
TECH TOPIC:	Carbon Capture	PROJECT TERM:	7/1/10 – 6/30/12
WEBSITE:	www.arpa-e.energy.gov/ProgramsProjects/IMPACCT.aspx		

CRITICAL NEED

Coal-fired power plants provide nearly 50% of all electricity in the U.S. While coal is a cheap and abundant natural resource, its continued use contributes to rising carbon dioxide (CO_2) levels in the atmosphere. Capturing and storing this CO_2 would reduce atmospheric greenhouse gas levels while allowing power plants to continue using inexpensive coal. Carbon capture and storage represents a significant cost to power plants that must retrofit their existing facilities to accommodate new technologies. Reducing these costs is the primary objective of the IMPACCT program.

PROJECT INNOVATION + ADVANTAGES

A team led by three professors at Texas A&M is developing a subset of metal organic frameworks that respond to stimuli such as small changes in temperature to trap CO_2 and then release it for storage. These frameworks are a promising class of materials for carbon capture applications because their structure and chemistry can be controlled with great precision. Because the changes in temperature required to trap and release CO_2 in Texas A&M's frameworks are much smaller than in other carbon capture approaches, the amount of energy or stimulus that has to be diverted from coal-fired power plants to accomplish this is greatly reduced. The team is working to alter the materials so they bind only with CO_2, and are stable enough to withstand the high temperatures found in the chimneys of coal-fired power plants.



IMPACT

If successful, the materials developed at Texas A&M would reduce the cost of carbon capture, enabling accelerated retrofitting of existing coal-fired power plants while satisfying consumer demand for electricity.

- SECURITY: Enabling continued use of domestic coal for electricity generation will preserve the stability of the electric grid.
- ENVIRONMENT: Carbon capture technology could prevent more than 800 million tons of CO_2 from being emitted into the atmosphere each year.
- ECONOMY: Improving the cost-effectiveness of carbon capture methods will minimize added costs to homeowners and businesses using electricity generated by coal-fired power plants for the foreseeable future.
- JOBS: Retrofitting coal-fired power plants to capture and store carbon dioxide could create jobs in the U.S. manufacturing, construction, and engineering sectors.

CONTACTS

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