

A new catalyst to transform propane into propene

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Researcher Adam Hock of Illinois Institute of Technology (IIT) and colleagues at Argonne National Laboratory (ANL) and Northwestern University have developed a new catalyst to transform propane into propene (propylene).

Propene, with worldwide sales of \$90 billion in 2008, is a crucial product for the [petrochemical industry](#), used in the manufacture of plastics, packaging and other applications. Current catalysts, while very active for the production of propene, also produce methane and ethylene

(smaller hydrocarbon fragments) through unwanted side reactions. Separating the desired products adds to the energy demand and cost of the process. The new catalyst, a silica supported single-site Zn(II) catalyst, is more selective for the desired propane to propene transformation, reducing waste, increasing efficiency, and potentially lowering production costs. Propane dehydrogenation for propene production is used in the United States and globally, particularly in the Middle East, and many plants are currently being built.

The Hock team's new catalyst is described in an article published in *ACS Catalysis* and is the subject of a patent application by IIT and ANL.

The *ACS Catalysis* article is the first in a series that will explore Hock and his team used isolated zinc atoms rather than the particles of metal typically used as the [catalyst](#). Because the zinc atoms are isolated they have a small number of available reaction pathways to follow and thus they are very selective for the removal of hydrogen from the short-chain alkane propane to yield propene and hydrogen.

"Chemists have long sought to transform one substance into another; however, chemical transformations often result in mixtures of products," said Hock. "This is especially true for difficult reactions that require the input of large amounts of energy because excess energy can cause side or subsequent reactions. Therefore, very selective catalysts for difficult reactions are highly sought-after."

Added Russell Betts, Dean of the College of Science, "This is an example of how profound understanding of basic science can lead directly to innovation in industry and in the marketplace."

Provided by Illinois Institute of Technology

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