

New zeolite material may solve diesel shortage

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World fuel consumption is shifting more and more to diesel at the expense of gasoline. A recently published article in *Nature Chemistry* by a research team at Stockholm University and the Polytechnic University of Valencia in Spain presents a new porous material that evinces unique properties for converting gasoline directly into diesel. The material has a tremendously complex atomic structure that could only be determined with the aid of transmission electron microscopy.

The aluminosilicate, which has been named ITQ-39, belongs to the zeolite class and has a [porous structure](#) that enables sufficiently small molecules to pass through it. On their way through, they can react with other molecules and create a desired product. The new material has channels of varying size and shape in different directions. These variously shaped channels entail that a molecule that is transported inside the material can be limited in different ways, depending on the direction it travels.

ITQ-39 is the most complex zeolite material ever discovered. Its structure was determined by a research team at Stockholm University headed by Professor Xiaodong Zou, with the help of electron crystallography. On an electron microscope, extremely small crystals can be studied, in this case down to a couple of nanometers. What makes ITQ-39 such a complicated material is that, unlike most other [crystalline material](#), it is not perfectly ordered. The material studied has a type of chaotic order. To be able to understand the material in the smallest detail requires both a model of how the atoms are arranged in the minimal

ordered areas and a model of how these domains are then linked together into crystals. This disorder can be studied with the aid of high-resolution images taken with an [electron microscope](#) that can then serve as a basis for creating a model of the atomic structure of the material. This is what researchers Tom Willhammar, Junliang Sun, Wan Wei, Peter Oleynikov, Daliang Zhang, and Xiaodong Zou at Stockholm University present in the latest issue of the scientific journal *Nature Chemistry*.

The material, which was produced by a research team headed by Professor Avelino Corma in the Polytechnic University of Valencia, has proven to be an excellent catalytic converter for turning gasoline into diesel. This is a process that has become ever more important with the marked growth in the demand for diesel in recent years.

More information: "Structure and catalytic properties of the most complex intergrown zeolite ITQ-39 determined by electron crystallography" *Nature Chemistry* 2012 ([DOI: 10.1038/NCHEM.1253](https://doi.org/10.1038/NCHEM.1253))

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