

World's only ultrafast electron microscope takes 4-D 'movies' of molecules

A unique electron microscope that can help create four-dimensional “movies” of molecules may hold the answers to research questions in a number of fields including chemistry, biology, and physics, according to an article scheduled for the Dec. 24 issue of *Chemical & Engineering News*, ACS’ weekly newsmagazine.

In the article, C&EN Associate Editor Rachel Petkewich notes that the microscope, located at the California Institute of Technology, is a modified transmission electron microscope interfaced with an ultrafast laser.

The ultrafast microscope is the only one capable of capturing four-dimensional pictures of molecules — 3-D structural changes over time — as they form and break apart, the writer states.

These reactions occur at extremely fast rates — one billionth of one millionth of a second, or a “femtosecond” — that can’t be seen directly in real-time by other instruments. In 1999, Caltech chemist Ahmed H. Zewail, the lead scientist on the new work, was awarded the Nobel Prize in Chemistry for his pioneering studies of these ultrafast reactions.

Zewail and his colleagues are now making refinements to their ultrafast microscope and plan to capture a wider variety of images, including the details of whole cells, the writer notes. Caltech is negotiating an agreement with a microscope manufacturer to commercialize the instrument and make it available to other scientists, according to the article.

External link: <http://pubs.acs.org/cen/science/85/8552sci1.html>

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