

New Microscope Zooms in on Atoms and Molecules

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SINGAPORE, SINGAPORE, SINGAPORE,
December 21, 2013 /EINPresswire.com/ -- New
Microscope Zooms in on Atoms and Molecules

[Electron microscopes](#) are about to get much more precise.

The microscope is one of the most important tools for advancing human understanding since it first became available to scientists during the Renaissance period. We've used it to understand everything from the inner workings of cells to the structures of our bodies. And, of course, as technology has advanced, so has the microscope. But a new breakthrough from Michigan State University may make the humble microscope even more useful than it already is to scientists across the world.



Atoms In Motion

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Essentially, electron [microscopes](#), used for the most fine and closely focused analysis of the tiny worlds around us, have had trouble showing what happens at the atomic level in real time. Often, these microscopes could only capture still images, or a string of images. These images were still useful for comparing before and after, and helped advance research considerably, but capturing the mechanism of change itself on the atomic level just wasn't viable.

Until now, that is. Chong-Yu Ruan, an associate professor of physics and astronomy, has been working on bringing electron microscopy down to the femtosecond, or one-millionth of a billionth of a second. And he's finally had a breakthrough that will make even the most hard-nosed scientist rejoice.

Gone In A Femtosecond

Precision in instruments is always good, but why to the femtosecond? Essentially, when atoms interact with each other, such as exchanging electrons or playing a role in a chemical reaction, it happens in a femtosecond. The reaction is so fast that capturing anything about it was largely a matter of blind luck... not something you should be counting on when trying to engage in serious scientific research.

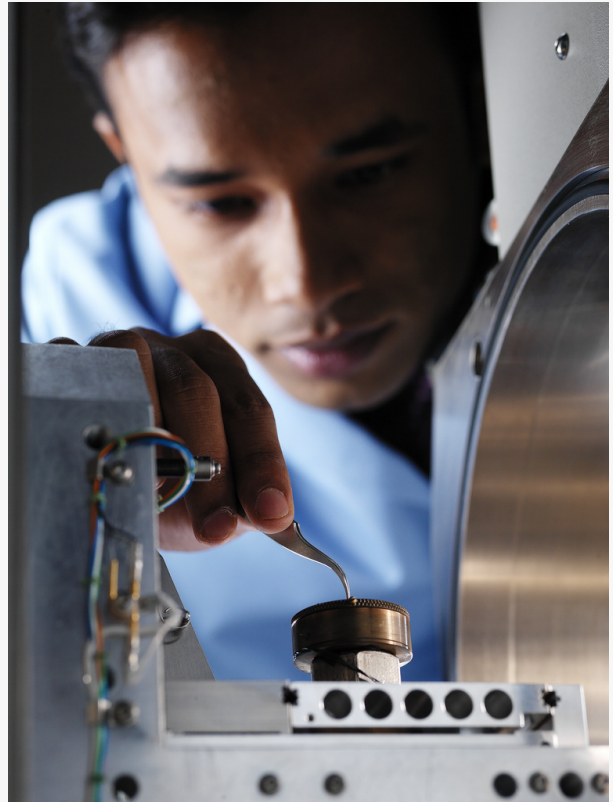
The speed of reactions has made understanding certain mechanisms more or less impossible, although data for theorizing was available. But with this new microscope, theories can be confirmed and new ideas can be tried.

The precision issue wasn't the only problem Professor Ruan addressed, however. Electron microscopes are enormously expensive machines that cost a fortune to buy, and can be difficult to find the funding to replace for many research hospitals and scientific facilities. So, his design is modular; instead of buying a new \$10 million microscope, researchers can spend \$500,000 on a simple, easily installed upgrade to their equipment.

True, half a million dollars can be hard to find in some budgets, but considering the alternative of trying to dig out millions for a replacement, many budget meetings are heaving a big sigh of relief.

Better microscopes means better research.

Towards The Future



So, once the femtoseconds can be ticked off, what will that mean in the research? The applications are arguably limitless. For example, in the medical field, doctors studying pharmaceuticals will, instead of having a before-and-after picture of a drug interacting with the body, be able to see the exact mechanism by which it does so. Instead of assuming that the structures of a microorganism work in a certain way, we'll be better able to understand how pathogens spread, offering new insight into disease prevention.

In short, the future of microscopes will be more precise... and more able to help us advance our understanding of the world.

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Ami Yetti

Tiara Intania Ltd

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