Movement of atoms viewed at 100 times higher than previous resolution

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A paper published in *Nature* (5 May 2005), by scientists at the Universities of Sheffield and Warwick and the European Synchrotron Radiation Facility, describes how experts have used X-rays to see structures in unprecedented detail at the atomic scale. The technique is 100 times more sensitive than any other method, and has the potential to allow scientists to improve things like data storage, healthcare sensors and security systems.

Prof Mike Gibbs, of the Department of Engineering Materials at the University of Sheffield explains, “We have known for some time that when certain magnetic materials are exposed to a magnetic field they lengthen or contract slightly. However, we still don’t have a detailed understanding”.

“This new technique uses X rays to look at the movement of atoms with unprecedented resolution; 100 times better than ever achieved before.”

“Once we can look at atom positions in this way, we will get a much better idea about the atomic structures of a range of materials, meaning that we will be able refine our understanding of how structures and materials are made up. This should lead to improvements in a wide range of technologies in the future.”

Dr. Robert Pettifer, of the University of Warwick says, “To improve a technique by two orders of magnitude means that phenomena can now be investigated which produce subtle changes in the local atomic

environment. For example, the ways atoms respond to temperature, electric field and pressure as well as the magnetic field investigated in our paper can now be investigated. Movements comparable to the size of a nucleus can now be resolved. The technique will be especially valuable for materials which are not easily investigated by more conventional techniques such as glasses and thin films.

“We can see applications in such diverse things such as computer disks, domestic refrigerators, and understanding the Earth’s core.”

Source: University of Sheffield