Brilliantly bright light source is one step closer to reality, says scientist

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New drugs to treat diseases could be developed, thanks to the XFEL

(PhysOrg.com) -- A brilliantly bright light source that can examine the detail of atoms at a microscopic level is one step closer, thanks to the adoption of a Europe-wide convention, says a leading scientist from Imperial College London.

The European X-ray Laser Project (XFEL) will harness a high energy short-wave laser light that is one billion times more brilliant than most modern x-rays to provide immensely detailed images of molecules and atoms.

Scientists believe a greater understanding of atoms and molecules could be used to develop better drugs to treat diseases or more environmentally efficient technologies for cleansing chemical effluents including carbon

dioxide from the atmosphere.

Fourteen European countries have agreed on a convention outlining their participation in the construction and operation of the XFEL. Professor John Wood, the College's International Relations Advisor and Chair of the XFEL International Steering committee, says:

"This agreement signifies that we are really close to starting the construction of a massive new European infrastructure project with scientists and the wider community set to reap the benefits for decades to come."

When built, this billion pound facility will be 3.3 kilometres long, starting at the town of Hamburg-Bahrenfel, in the federal state of Hamburg, and ending in the town of Schenefeld in the neighbouring state of Schleswig-Holstein, Germany.

Scientists will be able to carry out a range of experiments that were previously impossible before. For instance, researchers will be able to film atoms as they undergo chemical reactions, or see molecules that were once too small for conventional technology, and analyse gas plasma, the stuff of which stars are made, in microscopic detail.

To see these images, electrons are shot down a 3.3 km long tube at very high speeds and are stimulated to emit x-ray light. These can analyse molecules and atoms in unprecedented detail because the x-ray light emitted is at extremely short wavelengths, between six and one tenth of a nanometre, which enables very high resolution images to be taken of microscopic surfaces.

The adoption of the convention by the XFEL International Steering Committee paves the way for an official signing which will establish the company that will be responsible for the construction and operation of

the XFEL.

Professor Wood says the construction of this XFEL will benefit a range of scientific fields including chemistry, biology, materials science and physics. Imperial researchers are also set to gain from the facility. He says:

“There are many in physics and materials science at Imperial who are already involved in the development of the XFEL’s scientific research programme and I know that they will be very pleased to hear that we are one step closer to construction of this facility.”

Countries participating in the XFEL project include Denmark, France, Germany, Greece, Hungary, Italy, Poland, Russia, Slovakia, Spain, Sweden, Switzerland, China and the UK.

Provided by Imperial College London

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