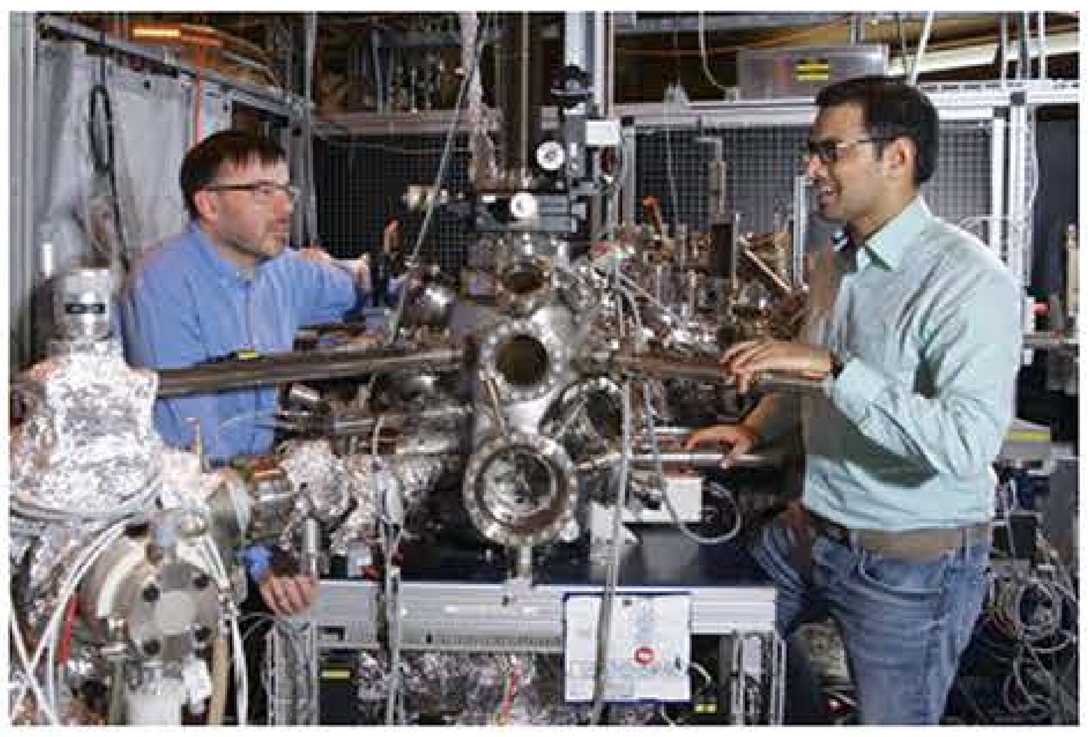
PSI facilities newsletter

https://www.psi.ch/science/facility-newsletter

Swiss Light Source Research Highlights

Nanotechnology enables new insights into chemical reactions

Catalyst support effects on hydrogen spillover
Waiz Karim, Clelia Spreafico, Armin Kleibert, Jens Gobrecht, Joost VandeVondele, Yasin Ekinci, Jeroen A. van Bokhoven , Nature 5 January 2017 DOI: 10.1038/nature20782



Eighty percent of all products of the chemical industry are manufactured with catalytic processes. Catalysis is also indispensable in energy conversion and treatment of exhaust gases. It is important for these processes to run as quickly and efficiently as possible; that protects the environment while also saving time and conserving resources. Industry is always testing new substances and arrangements that could lead to new and better catalytic processes. Researchers of the Paul Scherrer Institute PSI in Villigen and ETH Zurich have now developed a method for improving the precision of such experiments, which may speed up the search for optimal solutions. At the same time, their method has enabled them to settle a scientific controversy more than 50 years old. They describe their approach in the journal *Nature*. Read more: https://www.psi.ch/media/nanotechnology-enables-new-insights-into-chemical-reactions

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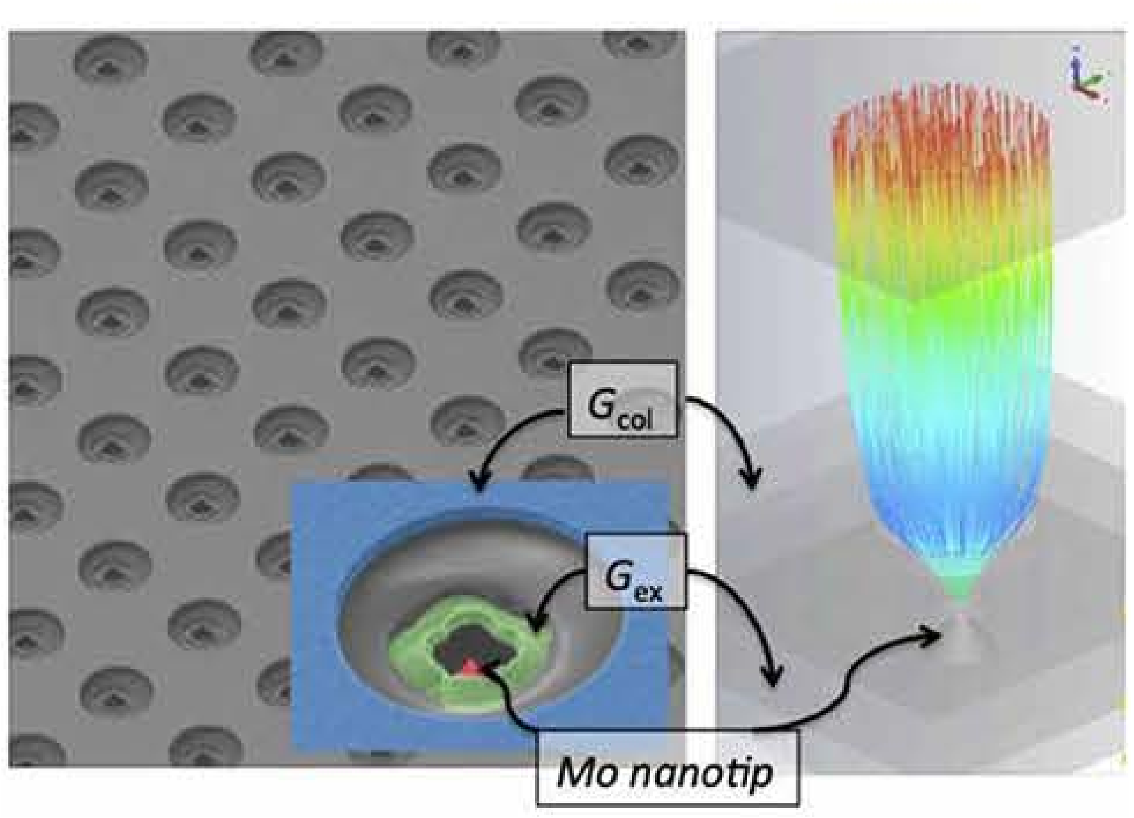
Can a metal nanotip array device be a low-emittance and coherent cathode?

Soichi ro Tsujino, Prat Das Kanungo, Mahta Monshipouri, Chiwon Lee, & R. J. Dwayne Miller
NATURE COMMUNICATIONS, 7:13976 (2016), DOI: 10.1038/ncomms13976



Nanofabricated low emittance field emitter array cathodes were demonstrated for the first time, and successfully applied to observe the low-energy electron diffraction from suspended 1 monolayer graphene. The work has an impact on the future development of compact X-ray free electron lasers, THz/RF vacuum electronic sources, and ultrafast electron imaging and diffraction experiments. Read more: https://www.psi.ch/lmn/nanotip-array-device-low-emittance-cathode

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SwissFEL First Lasing

End of 2016 SwissFEL observed for the first time FEL lasing in the undulator line. The lasing was achieved with a commission beam of low intensity, repetition rate and energy, i.e. 100pC/bunch, 1Hz and 377MeV. The 12 undulators were set to a K value of 1.2. The resulting wavelength computed from beam energy and undulator K value is 24nm. The FEL signal was observed with a Si-diode detector. The spontaneous radiation signal with uncompressed electron beam increased by a large factor when the beam was compressed from 10ps to about 1ps at constant charge and electron beam energy. By opening the undulator gaps a first FEL gain curve was measured. Read more: https://www.psi.ch/swissfel/highlights