

Properties and Nanochemistry of Advanced SiC, Graphene & Eutectics Materials at Nano/ Micro Scales: Applications and Electric Propulsion in the Space

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日 時:平成29年11月21日(火) 11:00 ~ 12:30

場 所:知識科学系講義棟2階 中講義室

講演要旨:

The Moore's law has powered the information-technology revolution since the 1960s. Due to new needs and challenges, it is approaching to its end. Thermal transport is now a major issue, especially at low-dimensional scales. Silicon carbide (SiC) & graphene are advanced semiconductors. SiC is especially suitable for high-temperatures, high-power, high-frequencies devices/sensors. Atomic lines, nanotunnels and selective nanochemistry are grown/developed at its surfaces and sub-surfaces. Epitaxial graphene grown on SiC exhibits outstanding figures of merit with unsurpassed charge transport properties & spin diffusion length, and the highest thermal conductivity. Furthermore, hydrogen atoms interacting with epitaxial graphene on SiC appears as a possible route toward prebiotic life in the universe. These aspects are studied by theory, synchrotron radiation-based photoemission, photoelectrons & X-rays diffraction, atom-resolved scanning tunnelling microscopy & spectroscopy (STM, STS).

Electric propulsion is developed for advanced spatial applications (NASA, USAF, Airbus Defence & Space). It requires materials able to operate in extreme environments, with low work function & high electronic emissivity as LaB₆. Eutectics-based on LaB₆ with embedded ZrB₂ fibers ($\varnothing \approx \mu\text{m}$) trigger a significant additional surface work function lowering with subsequent electronic emission increase. Their structure and properties are studied by LEEM, PEEM & ThEEM state-of-the-art microscopies.

講演者略歴:

Prof. Patrick Soukiassian is Professor of Physics (Exceptional Class) at the University of Paris-Sud/Orsay since 1988 and Emeritus Professor since 2013. He is also Scientist at Commissariat à l'Energie Atomique et aux Energies Alternatives - CEA (French Atomic Energy Commission) – Université Paris-Saclay.