

Synchrotron Radiation: Promising Nano Probe for Science, Technology & Innovation

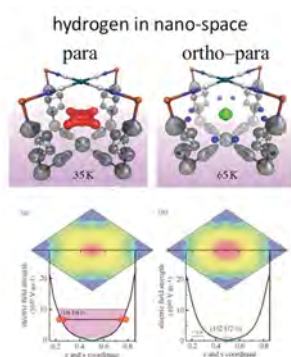
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Synchrotron Radiation(SR) has been recognized as a premier research tool for developments of Science and Technology. Large scale SR facilities around the world constantly evolved to provide super brilliant and superdirective X-ray and built a range of new scientific disciplines from materials science, physics, geoscience, chemistry, and biology to nanotechnology and energy science. For instance, chemistry of Metal Organic Framework(MOF) has been rapidly developed by advanced structural analysis using the world biggest SR facility, SPring-8 in Japan. The latest result uncovered a role of coordination nano-space as stage of hydrogen ortho-para conversion by the visualization of electric field in nanopore of MOF¹⁾. Nano application combined SR polarization control allows magnetic domain visualization of NdFeB magnet with 100nm resolution. Such a success of advanced SR applications has promoted varied industry applications at SPring-8.

On average, 20 percent of public utilization at SPring-8 is conducted by industrial users. Of particular interest to industry, however, is whether continuing investment in research and development using synchrotron radiation will pay enough dividends in innovative technology and products. Thus, the industry's demands for cutting-edge ways to use what light sources have to offer in beam strength, low emittance and more will continue to increase. As one way to meet these demands from industrial users, a novel alliance between industry and academia was proposed and implemented at SPring-8 for the soft-matter industrial research area. The alliance consisted of units, each composed of one representative of academia and one from industry, who worked together to define better ways to use synchrotron radiation as a research and development tool.

The initial result of this alliance was the formation in 2007 of the Advanced Softmaterials Beamline Consortium, with members from 19 companies and universities, which constructed a dedicated beamline at SPring-8. The example provided by this consortium has prompted a movement to launch project-oriented beamline construction based on the "industry-academia alliance" blueprint. Two more dedicated beamlines – one to study catalytic reaction dynamics for fuel cells and one to study advanced basic science for battery innovation – were constructed in SPring-8. The Industry-Academy Alliance is still evolving a new concept, as "Coalition Concept", arising out of the dialogue with industries and professors about outlook of new Project on 3 GeV Light Source, SLiT-J in Japan. The latest status and the perspectives on advanced SR industry application will be presented.

1) Royal Society Open Science(2015)



Coordination nano-space as stage of hydrogen ortho-para conversion

