

Man-Made Nano- and Micromachines

Presenter: Prof. Dr. Alexander A. Solovev
Department of Materials Science, Fudan University (复旦大学), China
Affiliation: Institute of Applied Optimization, Hefei University, Hefei, Anhui, China
Time: Monday, 2019-07-08, 10:00
Location: 合肥学院, Building No. 33: Sino-German Incubator, Room 210

Miniaturization in the machine design leads to multiple improvements of machine performance including negligible inertia, higher surface to volume ratio, higher strength to weight ratio, volumetric energy density, efficiency, faster relative motion and ultra-precise movements. We made a breakthrough development by making a new generation of catalytic nano-/micromotors consisted of inorganic nanomembranes. This result is a major step forward to a practical powering of tomorrow's micro- and nanomachines and it represent the entry in the Guinness book of world records for "the smallest man-made motors." Today, nano-/micromachines are fascinating new devices, which can transform local chemical energy and/or energy of external field (e.g. light, ultrasound, temperature, magnetic field, electric field) into autonomous movement, pumping of fluids and potentially revolutionary ways of clean energy generation, diagnostics and therapy. My presentation will discuss concepts, achievements, challenges and perspectives facing man-made nano-/micromachines, their technological relevancy and important breakthroughs.



Prof. Dr. Alexander A. Solovev received his Ph.D. from the Institute for Integrative Nanosciences, Leibniz Institute for Solid State and Materials Research, Germany. During past 15 years, he was working in many different institutes worldwide, including the Max Planck Institute, Leibniz Institute, Technical University of Munich, Princeton University and Columbia University in the City of New York. He was a postdoc with Prof. Geoffrey Ozin at University of Toronto and a visiting scholar with Prof. David Weitz at Harvard University. Currently, Dr. Solovev holds a full professorship at the department of Materials Science, Fudan University, Shanghai, P.R. China. His group is renowned for innovative and transformative fundamental scientific, technological advances and original contributions to fields of inorganic nanomembranes capable of producing novel quantum, chemical, electrical, optical and mechanical properties in unprecedented ways. His awards include: the Emerging Leader from IopScience Publishing, "1000 Talent" Award from the central government of China, "Dawn program" Award from Shanghai City, Humboldt Feoder Lynen, Max Planck, University of Toronto fellowships, DSM Science and Technology Award from Switzerland, the DAAD Prize and he hold the Guinness Word Record for "the smallest man-made jet engine". Moreover, Prof. Solovev is the founder of a global academic innovation network (GAIN) that has a high potential to significantly enhance the cross-disciplinary collaborations, academic quality and research impact. Interests of his research lab include new properties of inorganic nanomembranes, nano-/micromachines, theranostics, clean water, clean air and clean energy.