Sou Ryuzaki

Kyushu University, Japan

Nanopore devices for nano-biomedical

Rapid structural analysis methods for biomolecules and biomaterials consisting of single or several molecules in solution represent innovative technologies to reveal their functions because the functions strongly depend on their own structures. However, there presently exist no rapid structural analysis methods for single nanomaterials suspended in liquid environment. Nanopore sensors have been widely used to investigate the volume of particles and molecules passing through the pore by probing temporal changes in the ionic current pulses. These pulse sensors have been developed for not only size but also shape of analyte during recent years. Smaller aspect ratio defined as the ratio of the depth to the diameter and a high-speed current detection system provide greater spatial resolution, i.e. tomograms of a material passing through a nanopore. Here we will report the development of low-aspect-ratio nanopores with a spatial resolution of ca.35.5 nm and the 10 MHz-current-amplifier, resulting in realization of ultrafast time resolutions of 1.0 μs for the tomography analysis of a material passing through a nanopore. Combining state-of-the-art technologies with Multiphysics simulation methods to translate ionic current data into tomograms of nanomaterials passing through a nanopore, we have achieved rapid structural analysis of single and dabble polystyrene (Pst) beads, and bionanomaterials such as E-colis in aqueous solutions [1]. In addition, we will also report plasmonic nanopore devices, which enable us to detect Surface-enhanced Raman Spectrum of a material inside a nanopore. The nanopore devices will be innovative technologies for the fields of Nano biodevices and structural biology.

Speaker Biography

Sou Ryuzaki is currently an assistant professor of Institute for Materials Chemistry and Engineering (IMCE) at Kyushu University. He graduated with his PhD from department of nuclear engineering at Tokyo Institute of Technology in March 2010. After receiving his PhD, he worked for Nano-Science Center of University of Copenhagen as a postdoctoral research fellow (2010–2011), and he was an assistant professor of Institute of Scientific and Industrial Research (ISIR) at Osaka University (2012–2014). He is engaged in researches related to fundamental materials physics (nanocarbons), plasmonics (plasmonic lasers), organic devices (photovoltaic cells), and nano biodevices (nanopore devices).

e: ryuzaki@ms.ifoc.kyushu-u.ac.jp

Notes: