



# Takehiko Tsukahara Lab.

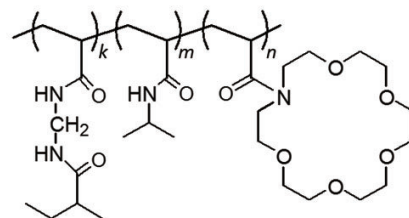
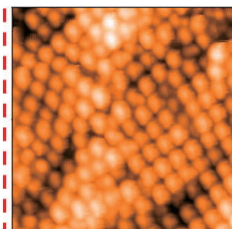
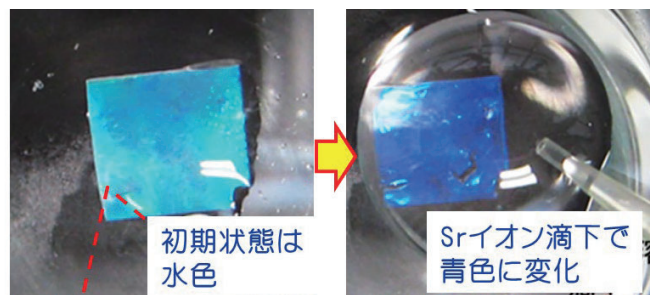
## View ! Measure ! Separate ! Reuse ! of Radioactive Elements

Laboratory for Zero-Carbon Energy

<http://www.zc.iir.titech.ac.jp/~ptsuka/>

- Creation of Functional Nanomaterials
- Micro/Nano Chemical Analysis System
- Waste-Free Solvent Extraction of Rare Metals

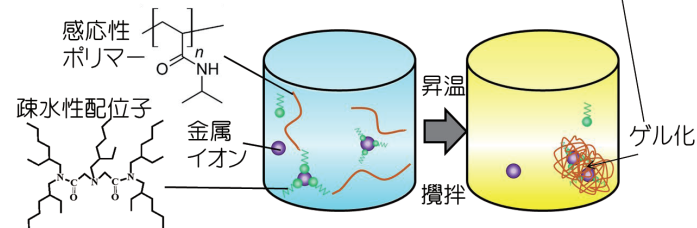
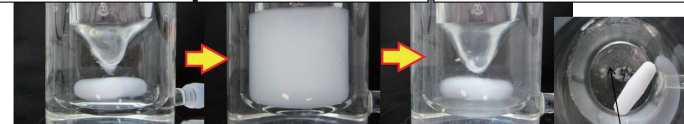
Large amount of radioactive wastes has been generated from nuclear facilities including NPP, reprocessing plants, and decommissioning sites. The reducing environmental impacts and waste volume have world-widely become of crucial issue. We aim to develop "a simple and environmentally-friendly nuclear chemical analytical system", which can recover and recycle target rare metals, by means of micro-nano technologies



### Metal Ion Sensing Using Photonic Crystal Polymers

• Develop visual detectable device, composed by inorganic nanoparticles and functional organic polymers, for sensing of radioactive elements.

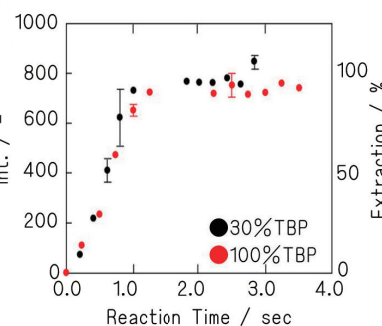
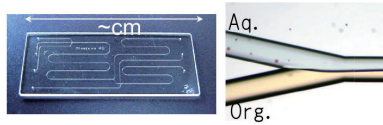
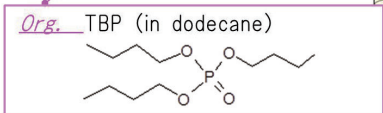
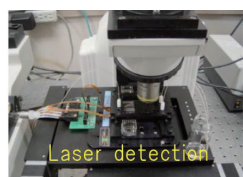
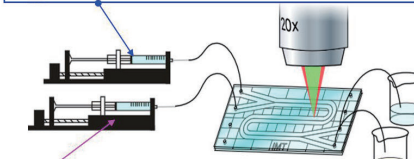
低温・水中で混合    昇温/ポリマー疎水化    疎水性相互作用でゲル化



### Waste-free solvent extraction for rare metal recycle

• Catch and release of target rare metals by controlling stimuli-responsive polymers and coordinating ligands in aqueous solutions without any organic solvents and resin.

Aq. 0.1 M  $UO_2(NO_3)_2 \cdot 6H_2O$  in 3M- $HNO_3$



### Micro/Nano Chemical System

- Integration of all chemical analysis operations such as mixing, reaction, separation, and detection on a microchip.
- By combining microscopic laser detection tools such as thermal lens microscope with microchip, we realized real-time detection of radioactive species in a droplet solution.