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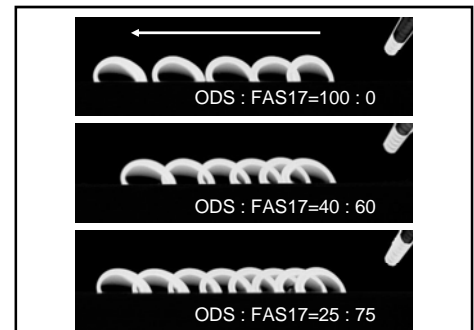
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Research field: Surface functional materials

## Research topics conducted within the G-COE project

### 1. Study of fluid control on solid surface

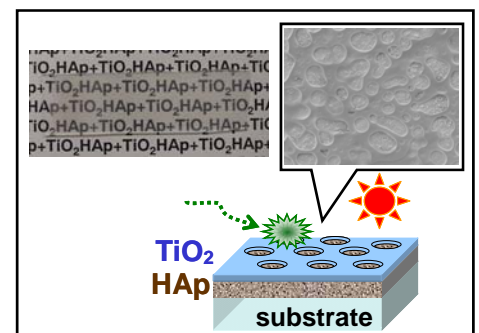
Fluids and gels are more flexible than solids. Their control on a solid surface with or without an external field can produce new functional surfaces and devices. Recent studies have clarified that even macroscopic dynamic behavior of fluids such as the sliding acceleration of a water droplet on a solid surface or internal flow dynamics during sliding are strongly affected by nano-level characteristics of solid surfaces. Using various materials, surfaces to control varieties of fluid or fluid droplets can be prepared. By bridging materials science and fluid mechanics, technologies can be established to control fluids and fluid droplets.



High-speed photographic images showing the sliding behavior of a water droplet on hydrophobic coatings treated using fluoroalkyl silane (FAS) and alkyl silane (ODS)

### 2. High-performance materials development for environmental purification using reaction field control

Solid surfaces are the substrate of chemical reactions and the contact point of solids and other substances. By controlling the spatial arrangement and chemical composition of reaction fields and adsorption fields on a nano-scale, new materials for environmental purification can be prepared. Synergistic effects by external fields are also examined.



Surface microstructure and transparency of a TiO<sub>2</sub>/apatite hybrid coating using phase separation.

### 3. Processing of surface functional materials using environmentally friendly processes

Using plasma and light, processing methods of surface functional materials with low environmental burdens will be developed.

## Representative publications

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 N.Yoshida, Y.Abe, H.Shigeta, A.Nakajima, H.Ohsaki, K.Hashimoto, T.Watanabe, *J. Am. Chem. Soc.*, 128[3], 743 (2006)  
 M.Sakai, J.-H.Song, N.Yoshida, S.Suzuki, Y.Kameshima, A.Nakajima, *Langmuir*, 22, 4906 (2006)  
 S. Suzuki, A.Nakajima, N.Yoshida, M.Sakai, A.Hashimoto, Y.Kameshima, K.Okada, *Langmuir* 23[17], 8674 (2007)