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Synthesis of Functional Materials by In-Liquid Plasma Processing

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A non-equilibrium plasma, characterized by a significant disparity between electron temperature and ion temperature, offers an enticing environment for various reactions. This unique setting holds the potential to facilitate low-temperature processes in material synthesis and other applications. Particularly noteworthy is the generation of plasma in liquid, which enables reactions to occur at temperatures below the liquid's boiling point, creating a distinctive and promising reaction milieu. We set-up two different cold plasmas: one is a so-called solution plasma using a bipolar pulse power supply. The other is a liquid plasma formed in a high energy state by a microwave power supply. By controlling the power supply conditions for the generation of the in-liquid plasma, the composition of the liquid, and the gas species introduced into the reaction field, we are working to develop materials and processes, aiming to contribute to a sustainable, recycling-oriented society. In the present study, we will introduce the photocatalyst of TiO2 with oxygen-vacancy induced by solution plasma, as well as the diamond synthesis using of in-liquid microwave plasma CVD method.

Biography:

Chiaki Terashima received his Ph.D. degree (2003) in electrochemical analysis at the University of Tokyo under the supervision of Professors A. Fujishima and K. Hashimoto. His academic career started at Nagoya University as an associate professor (2010-2011) in Professor O. Takai's group, and then moved to Tokyo University of Science in 2012. He is currently a professor at Tokyo University of Science starting at 2018. His research interests are focused on photocatalysts, diamond electrochemistry, CO2 reduction, and plasma processing in liquid.