

# Nano Second Technology for Ceramics Engineering Application

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Electrochemistry of non-aqueous solution is a chemistry to deal electron transfer between materials in non-aqueous solutions and various phenomena associated with it. By using appropriate non-aqueous solvent or a mixed solvent other than water, it becomes possible to cause a new reactions or purpose reactions by material's dissolved state and the reactivity changes. Furthermore, electro-rheological (ER) fluid is a functional fluid application that the rheological properties change by applying an electric field. This paper is intended to develop a new ceramic structure control method by combining the electrochemical of non-aqueous and the ER fluid. The main purpose of this study is a driving control of micro-structure by electric field. In particular, the drive control of the micro-structure in a non-aqueous solution to control from the outside by the electric field, are considering applications such as metering pump in the non-aqueous solution. In this study, we investigated the behavioral mechanisms of the inorganic material in non-aqueous solution when an electric field is applied. When a DC electric field is applied to the ZrO<sub>2</sub> balls in the polysiloxane solution, repetitive motion between the electrodes on an irregular interval was observed. In this repetitive motion, ZrO<sub>2</sub> balls is moved to the opposite polarity of the electrodes by the time elapsed from the beginning to the contact with the electrode. It has conducted a survey from the point of view of the electrochemical of non-aqueous solutions and electrophoresis for the mechanism of this repetitive motion.