# CT09

## Structure and Magnetism in Various Phases of Dodecylamine-intercalated Vanadium Oxide

**Hyocheon Kweon, Kyu Won Lee, and Cheol Eui Lee***
Department of Physics and Institute for Nano Science, Korea University, Seoul 136-713, Korea
*Corresponding author: Cheol Eui Lee, e-mail: rscel@korea.ac.kr

A structural study employing x-ray diffraction (XRD) and Fourier transform infrared spectroscopy has been made on a two-dimensional (2D) self-organized compound $VOx(C_{12}H_{28}N)_y$ (C12VO) comprising inorganic vanadium oxides and organic dodecylammonium surfactants. According to the synthesis process, the materials showed various phases such as a one-dimensional lamella phase and a 2D centered rectangular phase as well as their mixed phases, judging from XRD patterns. Electron spin resonance (ESR) experiment showed a characteristic spectrum in each phase indicating a distinct distribution of $V^{4+}$ and $V^{5+}$ ions in each phase. Fig. 1 shows the characteristic ESR spectrum in 2D centered rectangular phase (OR) and 1D lamella phase (SR) as well as their mixed phase (1:1 RL). Distinct distribution of $V^{4+}$ and $V^{5+}$ ions in vanadium oxide may correspond to a distinct magnetism.

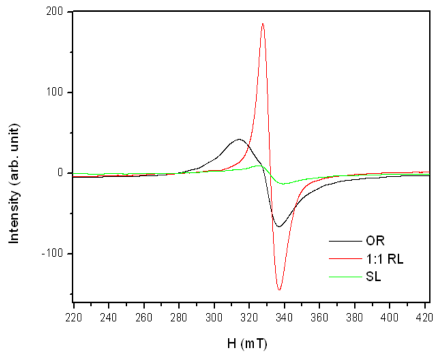


**Fig. 1.** ESR spectra in each phase of C12VO.

# CT10

## Investigation for Motion of Brownian-magnetic Nanoparticles in the Magnetic Field

**Bumjun Cha[1], Jaemoon Yang[1], Yong-Min Huh[2], Yongjin Song[3], and Seungjoo Haam[1]***
[1]Department of Chemical Engineering, Yonsei University, Seoul 120-749, South Korea
[2]Department of Radiology and Research Institute of Radiological Science, College of Medicine, Yonsei University, Seoul 120-752, South Korea
[3]Department of Physics, Ajou University, Suwon 433-749, South Korea
*Corresponding author: Seungjoo Haam, e-mail: haam@yonsei.ac.kr

In applications such as magnetic drug delivery system (MDDS), bioseparation and immunoassays, prediction of motions of magnetic particles under the magnetic field is vital for evaluating the affinities of the particles delivered to target tissues [1, 2, 3]. A theoretical model is presented to compute the mobilities and the trajectories of superparamagnetic nanoparticles (SMNPs) in non-uniform magnetic field. Our constitutive model equation integrates Brownian force, magnetic force and Stokes-Cunningham drag force under magnetic field. Previously developed white noise process was used to evaluate Brownian force of nano-size particles [3]. The magnetic and drag forces acting on nanoparticles were already described [4]. Non-uniform magnetic field generated from a cylindrical bar type permanent magnet was first calculated by using simulation software (Ampere). Then Lagrangian trajectories of SMNPs are analyzed under the calculated magnetic field according to the sizes of SMNPs. The effects of magnetic field and volumetric flow rate on the displacement of SMNPs to the magnet were investigated. The results showed that the magnetic field conduction was practically feasible for delivery of therapeutic agents to target tissue magnetically.

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