Magnetic anisotropy of bulk and rod shape amorphous silica

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In a microgravity experiment, it was generally difficult to release a small sample a diffuse area because of various attractive forces. The enormously enhanced anisotropy observed at the silica surface is not solved as yet. In order to solve this problem, a structural anisotropy at atomic scale should be experimentally identified. We therefore performed Electron Spin Resonance ESR in the above sample plates, and angular dependence with uni-axial symmetry was obtained with its principle axis nearly normal to the silica surface. Angular dependence of the ESR spectra was observed in these samples, and existence of structural anisotropy at atomic level in the surface area. This can be the cause of the large anisotropy value. It is natural to assume that the observed anisotropy originate from the ferrous ion isolated in the material. Structural anisotropy at atomic scale produces by the process of rapid cooling. As performed in the present report, comparison between the anisotropy data and the ESR spectrum will provide useful information to study the cause of the observed anisotropy. Further information will be obtained by changing the experimental conditions in synthesizing the samples.