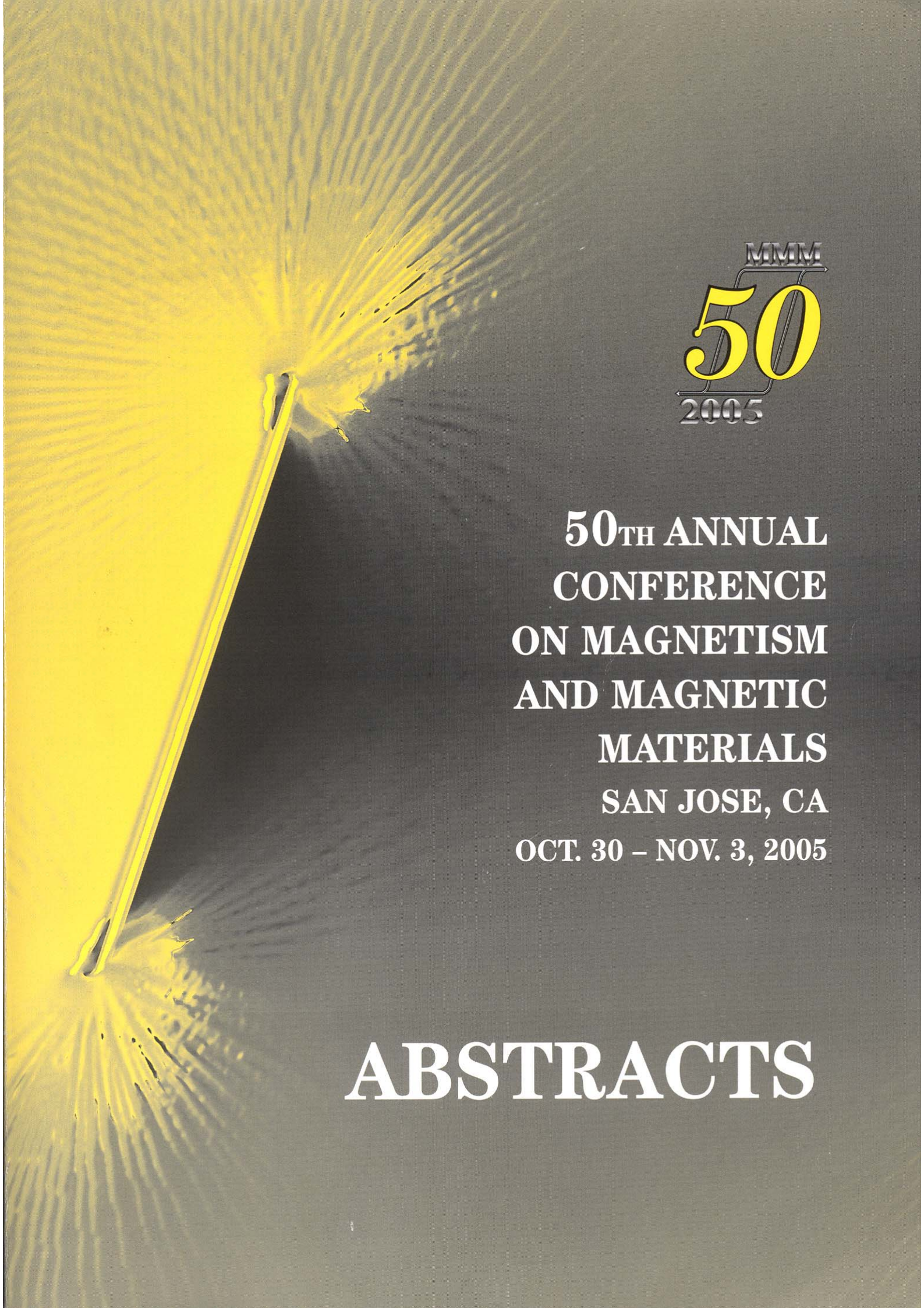

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ABSTRACTS

FQ-13. Ferromagnetic Properties of Anatase Ti1-xFexO2-δ Thin Films.

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Magnetic and electronic properties of Fe-doped anatase TiO2-δ thin films grown on Al2O3(0001) substrates by a sol-gel method have been investigated by vibrating-sample magnetometry (VSM), conversion electron Mossbauer spectroscopy (CEMS), and Hall effect measurements. Anatase Ti1-xFexO2-δ thin films were found to exhibit ferromagnetism at room temperature by VSM with the saturation magnetic moment up to 2 μB per Fe ion. The isomer shifts in CEMS are 0.26-0.28 mm/s, indicating a ferric character. The CEMS spectra also revealed that Fe3+ ions mostly substitute the octahedral Ti4+ sites of Ti1-xFexO2-δ. The Ti1-xFexO2-δ films exhibited poor electrical conductivity with p-type character. The ferromagnetism in the present Ti1-xFexO2-δ films can be explained in terms of a direct ferromagnetic coupling between two neighboring Fe3+ ions via an electron trapped in oxygen vacancy. The observed decrease of the net magnetization with the increase of the Fe content is attributable to an increase of antiferromagnetic superexchange interaction between two neighboring Fe3+ ions via O2- ion.