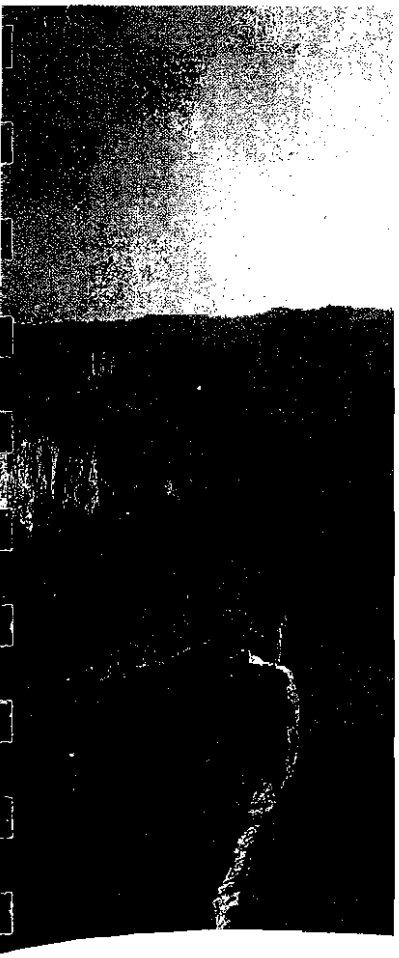

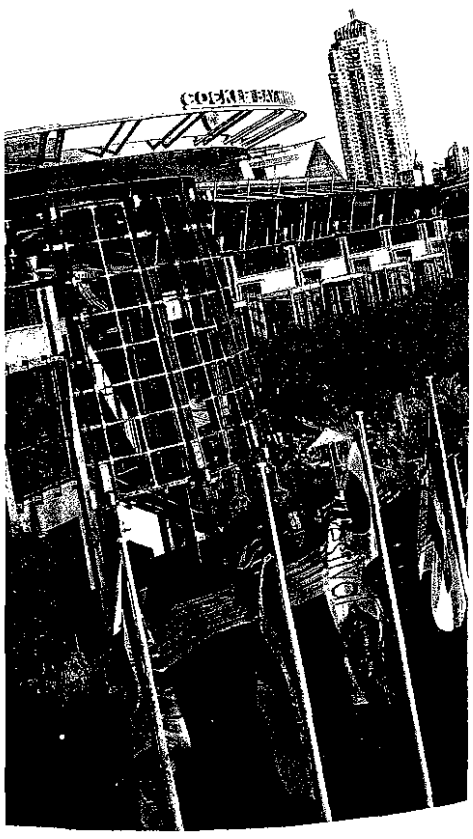

ETOPIM 7

The 7th International Meeting on the Electrical, Transport and Optical Properties of Inhomogeneous Media

July 9-13, 2006
Dockside, Cockle Bay Wharf on Darling Harbour, Sydney, Australia

July 14, 2006
Mini Symposia, the University of Sydney, the Australian Technology Park & the University of Technology, Sydney

Convenors

Ross McPhedran, David McKenzie, Marcela Bilek, Stuart Anderson

Major Sponsors

Australian Government
Department of Education, Science and Training

The University of Sydney

This project is supported by the International Science Linkages established under the Australian Government's innovation satement, Backing Australia's Ability.

We wish to thank the Air Force Office of Scientific Research, Asian Office of Aerospace Research and Development (AFOSR/AOARD), and US Army ITC-PAC Asian Research Office (ARO) for their contribution to the success of this conference.

71-Invited

Soft Ferromagnetic Materials based on Iron/Carbon Multilayers

David McKenzie, Marcela Bilek, SCH Kwok, PK Chu

School of Physics, University of Sydney, NSW 2006;

Magnetically soft ferromagnetic materials are sought after for applications in high density magnetic recording. The recording head of a magnetic memory device requires a magnetically soft material with good wear properties to imprint the signal in the magnetic recording medium. The trend to increasing recording densities has led to designs in which the magnetization is perpendicular to the surface and this requires a magnetically soft underlayer to assist in the creation of the perpendicular field. Tetrahedral amorphous carbon (ta-C) is a form of amorphous carbon in which there is a high density of unpaired spins which can lead to paramagnetism and under some conditions, superparamagnetism. We have prepared multilayers consisting of alternating layers of iron and ta-C using pulsed cathodic arc deposition. The magnetic hysteresis curves of the resulting multilayers were measured in a SQUID magnetometer and the magnetic properties were studied a function of the thickness of the layers. For some combinations, the materials become very soft and have a higher permeability than pure iron. We propose a model for the behaviour of the multilayers in which magentisation arising from the carbon paramagnetic spins couples to the iron magnetic domains.