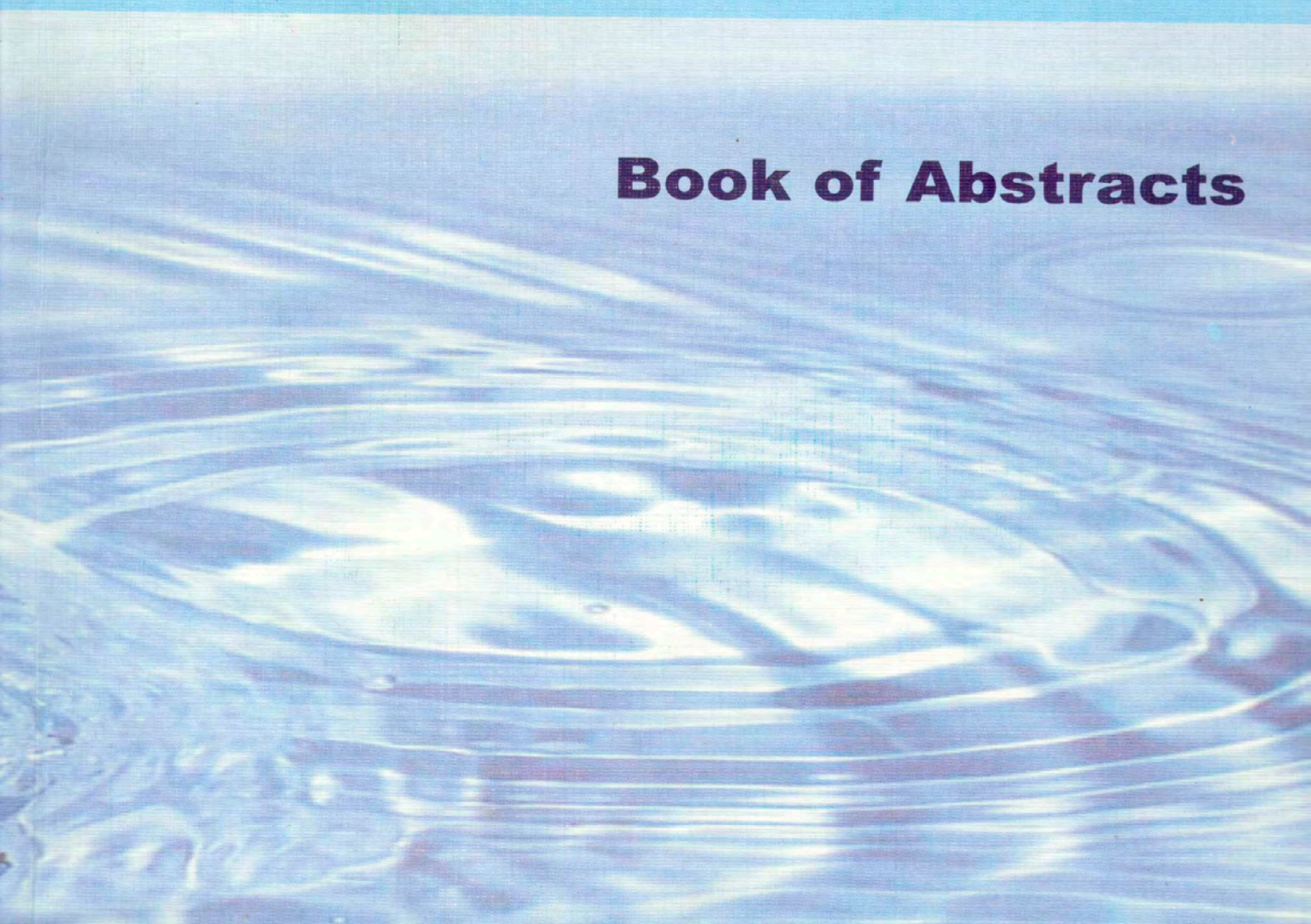
APES 2006

5th Asia-Pacific EPR/ESR Symposium

August 24-27, 2006
Novosibirsk, Russia



Book of Abstracts

PO 83

EPR/ESR and New Aspects of "Devil Staircase" in Modulated Systems

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The research results of conduction ESR (CESR) spectra of graphite intercalation compounds (GICs) with nitric acid ($C_{10}HNO_3$) and EPR spectra of crystals $MgBF_6 \cdot 6H_2O:Mn^{2+}$ (B – Si, Ge and Ti) in their modulated phases are presented.

In $C_{10}HNO_3$ in a liquid phase of "guest" molecules ($T > T_C \approx 250$ K) the CESR linewidth does not depend on temperature. In the solid quasi-two-dimensional incommensurate phase of "guest" molecules ($T < T_C$) the temperature dependence of CESR linewidth has a multi-broken character with a "global" temperature hysteresis. Independently on the sign of temperature change, the 'breaks' take place near the same values of the CESR linewidth. The found features of the CESR linewidth temperature dependence point out the change of intercalate density modulation vector in a mode of "devil's staircase". The found peculiarities of CESR linewidth temperature dependence may be explained by the presence of interaction between amplitude and phase of density modulation wave vector in the temperature intervals between 'breaks'.

According to the EPR data the crystals $MgBF_6 \cdot 6H_2O:Mn^{2+}$ (B – Si (a), Ge (b) and Ti(c)) at cooling of a(b)[c] at $T_{i1} = 369(403) \pm 1$ K, $T_{i2} = 344(380)[366] \pm 1$ K and $T_C = 298(316)[300] \pm 1$ K undergo structural phase transitions of the 2nd and the 1st (the latter two) order. The phase transition at T_{i1} is a 2nd order transition of a paraphase-incommensurate phase type and is accompanied by a smooth inhomogeneous broadening of the Mn^{2+} HFS lines, which are gradually transformed into a two-peak form. In all crystals, between T_{i2} and T_C, a succession of step-wise changes in the slope of HFS line shape parameter curves, which are less significant than those at T_{i2}, are observed. Independently on the sign of temperature change, the temperatures of these step-wise discontinuities T_{in} ($n = 2 \div 6$) occur at a practically the same values of HFS line shape parameters.

The similarity of the phenomena, which have been observed in modulated phases of very different systems, specifies that they are caused by the earlier unknown fundamental property of modulated systems. It may be the interaction between amplitude and phase of modulation wave vector in the temperature interval of stability of modulated phase (between steps of "devil's staircase"). It appears that this interaction is the reason for step-wise change of a modulation vector.

ISBN 5-91124-009-2

5th Asia Pacific EPR/ESR Symposium:
Book of Abstracts / Ed. by D.V. Stass. – Novosibirsk:
Publishing House "Sibirskoe Nauchnoe Izdatelstvo", 2006. – 222 p.

Ответственный за выпуск Д.В. Стась

Формат бумаги 60 x 84 / 8, Усл п.л. 28
Уч.-изд. л. 11,5, Тираж 200 экз.

ИД № 04742
ООО «Нонпарель»
630008, Новосибирск, ул. Ленинградская, 141

Отпечатано в типографии
ООО «Нонпарель»
630090, Новосибирск-90, Институтская, 4/1