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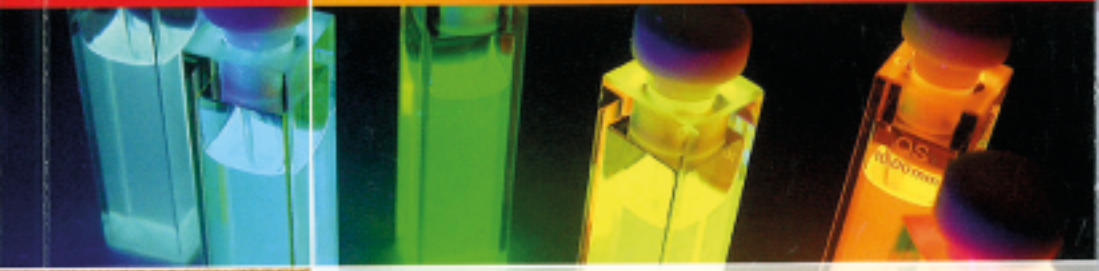

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BOOK OF ABSTRACTS

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Charge transport properties of Fe-doped $SrTiO_3$ thin films upon DC voltage

Stefanie Huber[2], Günter Fafilek[1] and Jürgen Fleig[1]

[1]Institute of Chemical Technologies and Analytics, Vienna University of Technology

Getreidemarkt 9, 1060, Vienna

Email: stefanie.huber@tuwien.ac.at

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$SrTiO_3$ thin films are known to exhibit charge transport properties that differ from those of bulk material [1]. Moreover, they show pronounced resistance changes upon bias voltage [2]. Both phenomena are still only partly understood and are most probably caused by a non-trivial interplay of mixed conduction and interfaces in $SrTiO_3$ thin films. The scope of this study was to get a clearer picture of the processes caused by migrating charge carriers in thin layers under DC voltage.

The investigated thin Fe-doped $SrTiO_3$ films were deposited on Nb-doped $SrTiO_3$ by pulsed laser deposition. In order to permit an electrochemical characterization, micro-structured $La_{0.6}Sr_{0.4}CoO_{3-\delta}$ (LSC) top electrodes were used. Impedance measurements were performed in a temperature range from 350°C to 700°C with an applied bias up to a few 100mV.

Measurements without applied bias revealed a strong decrease in the conductivity of the $SrTiO_3$ layers compared to data for bulk samples. Under applied bias the conductivity further changed with a strong dependence on polarity (cf. Hebb-Wagner polarization). Moreover an additional, partly inductive impedance contribution could be observed at low frequencies. Corresponding current-voltage measurements showed a strong dependence of the curves on the measuring rate. Correlation of both measurement modes allows a detailed analysis of defect chemical changes and transport properties of polarized $SrTiO_3$ thin films.

[1] C. Ohly *et.al.*, J.Europ.Ceram.Soc., 2001, **21**,1673-1676

[2] R. Muenstermann *et.al.*, Adv.Mater. 2010, **22**, 4819-4822