**THERMOPOWER AND CONDUCTIVITY OF AEROSOL DEPOSITED $BaFe_{1-x}Ta_xO_{3-\delta}$ FILMS**

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The thermopower, also known as Seebeck coefficient, is an important parameter to determine constants for defect chemical models of semiconductor materials since it is a measure for the charge carrier concentration. The Seebeck coefficient does not depend on the geometry of the material, like the often investigated conductivity. $BaFe_{0.7}Ta_{0.3}O_{3-\delta}$ is known as a temperature independent conductometric oxygen sensor material with perovskite crystal structure. The present work considers the thermopower as well as the electrical conductivity of $BaFe_{1-x}Ta_xO_{3-\delta}$ for *x* in the range of 0.1 to 0.45 (BFT*x*). Seebeck coefficient and conductivity were measured simultaneously between 400 and 850°C under varying oxygen partial pressures from $10^{-2}$ to 1 bar. BFT*x* fine powders have been prepared by conventional mixed-oxide route and were calcined at 1350°C. Crystal structure and phase purity were investigated by X-ray diffraction. BFT*x* thick-films have been successfully deposited by the novel Aerosol Deposition Method (ADM) at room temperature on a special transducer. This well designed transducer includes four platinum electrodes and two gold-platinum thermocouples. Both, thermopower and electrical conductivity, of samples with tantalum contents between *x*=0.2-0.3 show almost no temperature dependency but depend strongly on the oxygen partial pressure in the temperature range from 700 to 850°C. Results are shown for sample BFT20 in figure 1 and figure 2. All samples have a positive Seebeck coefficient and no n-p-type transition was observed in the investigated oxygen partial pressure range. In contrast to the electrical conductivity, the Seebeck coefficient of all samples decreases with increasing oxygen partial pressure. An initial defect chemical model of BFT*x* will be presented in this study as well.

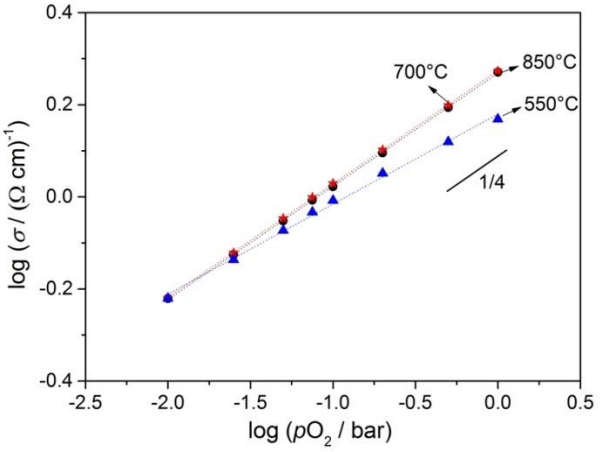


*Figure 1 – Log-log plot of the oxygen partial pressure vs. conductivity of a BFT20 aerosol deposited thick film. The curves for 700 °C and 850 °C are almost identical.*

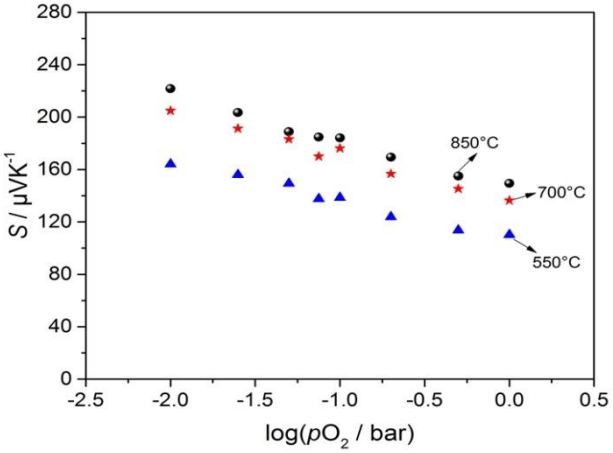


*Figure 2 – Oxygen partial pressure dependence of the Seebeck coefficient of a BFT20 aerosol deposited thick film.*