High Oxygen Pressures and the Stabilization of the Highest Oxidation States of Transition Metals – Mössbauer Spectroscopic Characterization of the Induced Electronic Phenomena

Gérard Demazeau[a], Alexey Baranov[a,b], Igor Presniakov[b], and Alexey Sobolev[b]

[a] University Bordeaux 1 "Sciences and Technologies", Centre de Ressources Hautes Pressions ICMCB-ENSCPB, 87 Avenue du Dr A. Schweitzer, 33608 Pessac Cedex, France
[b] Department of Chemistry, Lomonosov Moscow State University, 119992 Leninskie Gory, Moscow-V-234, Russia

Reprint requests to Prof. G. Demazeau. E-mail: demazeau@icmcb-bordeaux.cnrs.fr

Z. Naturforsch. **61b,** 1527 – 1540 (2006); received July 3, 2006

High oxygen pressures are a fruitful tool for the stabilization of the highest formal oxidation states of transition metals (M^{n+}) leading to the strongest chemical bonds; the improvement of the M^{n+}–O bond covalency induces different electronic phenomena. Among the physical characterizations applied to investigate such phenomena, ^{57}Fe and ^{119}Sn Mössbauer spectra are evaluated for studying unusual electronic configurations, orbital ordering, charge disproportionation and insulator-metal transitions in the perovskites series of ^{57}Fe doped *RE*NiO_3 nickelates (*RE* = rare earths, Y and Tl) and ^{119}Sn doped *AE*FeO_3 ferrates (*AE* = Ca, Sr).

Key words: Oxygen Pressure, High Oxidation States, Mössbauer Spectroscopy, Electronic Configuration, Orbital Ordering, Charge Disproportionation, Insulator to Metal Transition