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

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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 $\text{RENiO}_3$ nickelates ($\text{RE} = \text{rare earths, Y and Tl}$) and $^{119}$Sn doped $\text{AEFeO}_3$ ferrates ($\text{AE} = \text{Ca, Sr}$).

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