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**MAGNESIUM-DOPED ZIRCON-TYPE RARE-EARTH ORTHOVANADATES:
STRUCTURAL AND ELECTRICAL CHARACTERIZATION**

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Abstract

Undoped LnVO_4 and magnesium-doped $\text{Ln}_{0.95}\text{V}_{0.95}\text{Mg}_{0.10}\text{O}_{4-\delta}$ ($\text{Ln} = \text{Pr}, \text{Sm}, \text{Gd}, \text{Dy}$ and Er) orthovanadates were synthesized by solid state reaction method and characterized by XRD, SEM/EDS, electrical conductivity measurements in controlled atmospheres, and modified e.m.f. technique for determination of oxygen-ion transference numbers. XRD analysis showed the formation of phase-pure materials with tetragonal zircon-type structure and a decrease in lattice parameters with a decrease of ionic radius of rare-earth cations. Trace amounts of MgO and Mg-V-O phases revealed by SEM/EDS suggest that the solid solubility limit of magnesium cations in LnVO_4 lattice is somewhat lower than the nominal doping level, and that magnesium substitutes preferentially into the vanadium sublattice. LnVO_4 and $\text{Ln}_{0.95}\text{V}_{0.95}\text{Mg}_{0.10}\text{O}_{4-\delta}$ orthovanadates show semiconducting behavior under oxidizing conditions at 450-950°C and are predominantly oxygen-ionic conductors, except PrVO_4 that shows mixed conductivity. In the LnVO_4 series, electrical conductivity is the highest for PrVO_4 and SmVO_4 ($\sim 4 \times 10^{-4}$ S/cm at 800°C) and decreases with increasing atomic number of rare-

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