Structural Analysis of $La_2Mo_2O_9$-based fast Oxide-ion Conductors

Philippe Lacorre[a], Gwenaël Corbel[a], Yvon Laligant[a], François Goutenoire[a], Emmanuelle Suard[b], [a]*Laboratoire des Oxydes et Fluorures, UMR CNRS 6010, Université du Maine, 72085 Le Mans cedex 9, France.* [b]*Institut Laue-Langevin, BP 156, 38042 Grenoble cedex 9, France.* E-mail: philippe.lacorre@univ-lemans.fr

Most substitutes to La or Mo in fast oxide-ion conductor $La_2Mo_2O_9$ [1] stabilise, above a certain content, the high-T partly disordered cubic β-form at room temperature. Their cell volume vary quasi-linearly upon substitution, with a Vegard-type evolution, as for instance in the $La_2Mo_{2-x}Cr_xO_9$ series [2].

The only known exception to this general trend is the series $La_2Mo_{2-x}W_xO_9$, which shows first a slow increase, then a clear decrease of the crystal cell parameter upon increasing tungsten content [2]. This is at variance with ionic radii, tungsten being slightly larger than molybdenum. Since tungsten has a stabilizing effect relative to the reducibility of $La_2Mo_2O_9$ [3], we have studied in detail its structural effect on this molybdate using neutron powder diffraction.

The main detected incidence on the oxygen sublattice is a change in site occupations, corresponding to a lowering of tungsten coordination number relative to molybdenum, without much change in individual metal-oxygen distances [2]. A new kind of description of the β-$La_2Mo_2O_9$ type structure can be used to depict other structural effects. It also gives a deeper insight in the adequacy of this structural type for anion conduction.

[1] Lacorre P., et al, *Nature*, 2000, **404**, 856. [2] Corbel G., et al., *Chem. Mater, submitted.* [3] Georges S., et al., *J. Mater. Chem.*, 2003, **13**, 2317.

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