Structure of CeO_2-$YO_{1.5}$ solid solution

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CeO_2 is an oxide with fluorite structure. It forms solid solutions with rare earth elements such as Y, Gd, and Nd over wide range of concentration. These solid solutions also show high oxygen ion conductivity. Despite of these interesting properties, the defect structure of these solid solutions is not understood well. In this study defect structure of CeO_2-$YO_{1.5}$ was studied.

CeO_2-$YO_{1.5}$ solid solutions of various concentrations were formed by co-precipitation from aqueous solution of cerium nitrate and yttrium nitrate. They were then fired at 1400^{o}C for several hours. They were characterized by x-ray diffraction, Raman spectroscopy, and density measurement. At low concentration of Y, the solid solution is in fluorite structure and the results of Raman spectroscopy supported it. At higher concentration of Y, it is in rare earth C-type structure. The results of density measurement indicated that defect structure at high concentration of Y is different from that at low concentration of Y. However, the results of Raman spectroscopy suggested that the structure at higher concentration of Y is closer to fluorite structure than rare earth C-type structure.