

"The Formation of Defect Clusters in Rare Earth Doped Ceria" Prof. Dr. Zhi-Peng Li Western Digital Corporation (USA), Guangxi University (China) E-mail: 26168101@qq.com

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Abstract: Solid oxide materials have been widely used as oxide ion electrolytes for applications in oxygen concentration cells and solid oxide fuel cells (SOFCs). One key criteria for the oxygen ion conductor development is the high ionic conductivity, which is largely influenced by defect-defect interactions in materials. Rare-earth doped ceria has been considered as a promising electrolyte candidate for intermediate temperature SOFC application. However, it is still unclear about the mechanism of ionic conductivity and related rare-earth dopant type, ionic radius and concentration. To fully exploit this relationship between the ionic conductivity and dopant concentration, it is essential to establish the mechanism of defect-defect interactions and the local defect structure of such defect associations. In this study, a comprehensive study of the defect structures in rare-earth doped ceria have been performed, through both experimental and simulation techniques. The defect cluster model is proposed accordingly, which can provide us a clear picture of the relation between the doping and ionic conductivity. It can also help us understand the microstructure evolution in rare-earth doped ceria at atomic level. Furthermore, this model can effectively predict the optimization of dopants in fluorite ceria, which shed light on the searching/developing of high ionic conductivity of rare-earth doped ceria.