

An Investigation on Structural and Optical Properties of CeO₂ and Cr doped CeO₂ Nanostructures

*Dissertation submitted in partial fulfillment of the requirements
of the Degree of Bachelor of Science in Chemistry
University of Kerala*

Submitted by

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CERTIFICATE

Certified that the dissertation entitled “**An Investigation on Structural and Optical Properties of CeO₂ and Cr doped CeO₂ Nanostructures**” is a bonafide record of the project work accomplished by **Gopika S, Maanas Baby, Megha S Kunnayyathu** in partial fulfilment of the requirement for Bachelor Degree in Chemistry of Kerala University is an authentic work carried out under my supervision and guidance during the period of 2021-2022.

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DECLARATION

We hereby declare that this project work entitled “**An Investigation on Structural and Optical Properties of CeO₂ and Cr doped CeO₂ Nanostructures**” submitted to Kerala University in partial fulfilment of Bachelor's Degree in Chemistry is a bonafide record of the work carried out under the guidance of **Ms. Bessy Mary Philip**, Assistant Professor, Department of chemistry, Bishop Moore College during the year 2021-2022 and no part of it has been submitted for any other degree or diploma.

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ABSTRACT

Cerium Oxide Nanoparticles are of special interest in research activity because of their astonishing properties in electronic devices due to their ferromagnetic nature, transparency to visible light, application in catalyst, solar cells, solid oxide fuel cell applications. At present, there is a study reporting ferromagnetism observed in Cr doped CeO₂ nanoparticles. Thus, doping of Cr may be helpful in interpreting RTFM in doped CeO₂. In this, synthesis of nanostructures of CeO₂ and Cr doped CeO₂ are done using modified auto combustion method using Cerium nitrate hexahydrate and citric acid. The sintered samples are taken for different characterizations including XRD Diffraction and UV-Visible Spectroscopy. By the XRD analysis, the phase structure of pure and Cr doped CeO₂, over the 2θ range 20-80° are examined eight peaks were observed and all the eight peaks were in perfect agreement with JCDPS data 34-0394 and well indexed to fluorite cubic structure of CeO₂. The fluorite structure of Cerium Oxide is maintained upon Cr doping can also be suggested by the absence of diffraction peaks corresponding to the Cr related impurity phase observed in the samples. The linear optical characteristics were investigated by the UV Visible DRS Spectra for the spectral limit 200-800 nm. As a result, the structural and optical properties of the prepared nanostructures are well studied.