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Effect of annealing on the $\text{Ce}^{3+}/\text{Ce}^{4+}$ ratio measured by XPS in luminescent $\text{SiO}_2:\text{Ce}$

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Ce doped silica has potential applications for a luminescent material as phosphors for cathodoluminescence, scintillators and detectors. Ce ions can occur in a trivalent or a tetravalent state: only the trivalent Ce^{3+}

state with a single 4f electron is optically active, while the tetravalent Ce^{4+} ion is non-luminescent. X-ray photoelectron spectroscopy (XPS) is a suitable technique to investigate the oxidation states of Ce in cerium oxides and such studies have been carried out because of the importance of $\text{CeO}_2/\text{Ce}_2\text{O}_3$ conversion in automotive exhaust catalysts. However, the XPS Ce(3d) spectrum of cerium oxide is rather complex as it contains ten closely spaced and overlapping peaks on a strong background. The main challenge is to obtain accurate fits to experimental data while still maintaining a good physical basis for the fitting parameters. The analysis of Ce in $\text{SiO}_2:\text{Ce}$ is even more challenging since the Ce concentration for luminescent samples is only in the region of 1

Level (Hons, MSc, PhD, other)?

PhD

Consider for a student award (Yes / No)?

yes

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

yes

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