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Effect of annealing on the Ce3+/Ce4+ ratio measured by XPS in luminescent SiO2:Ce

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<p>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<sup>

3+</sup> state with a single 4f electron is optically active, while the tetravalent Ce⁴⁺ 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 CeO₂/Ce₂O₃ 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 SiO₂: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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