

## Synthesis and functionalization of biocompatible Tb:CePO<sub>4</sub> nanophosphors with spindle-like shape

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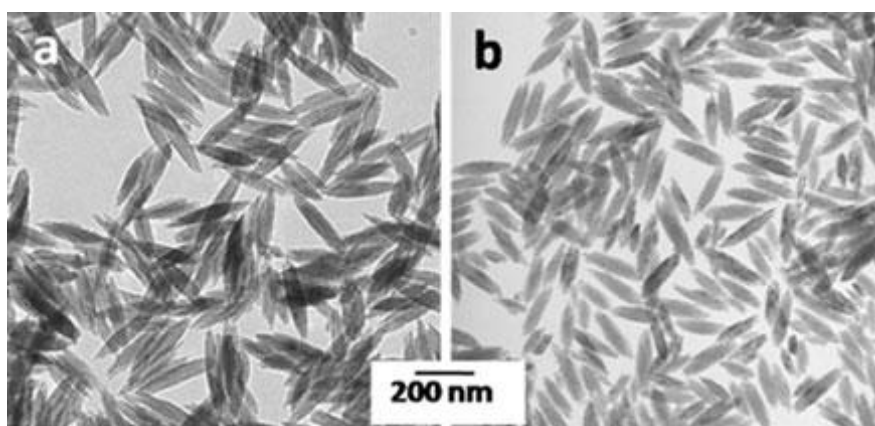
### Abstract

Monoclinic Tb:CePO<sub>4</sub> nanophosphors with a spindle-like morphology have been prepared through a very simple procedure, which consists of aging at low temperature (120 °C) an ethylene glycol solution containing only cerium and terbium acetylacetonates and phosphoric acid, not requiring the addition of surfactants or capping agents (Figure 1). The influence of the heating mode -conventional convection oven (CC) or microwave oven (MW)- and of the Tb doping level on the structural, morphological and luminescent features of the precipitated nanoparticles have been analyzed. This study showed that microwave-assisted heating resulted in an important beneficial effect on the luminescent properties of these nanophosphors (Figure 2). Finally, a procedure for the functionalization of the Tb:CePO<sub>4</sub> nanoparticles with aspartic-dextran is also reported. The functionalized nanospindles presented negligible toxicity for Verocells, which along with their excellent luminescent properties make them suitable for biomedical applications (Figure 3).

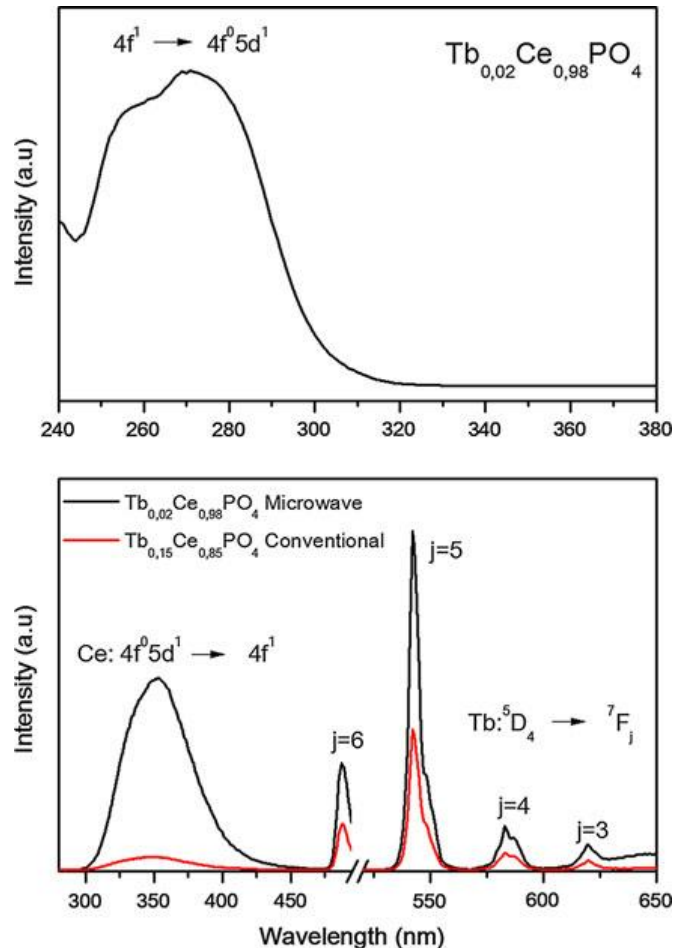
### References

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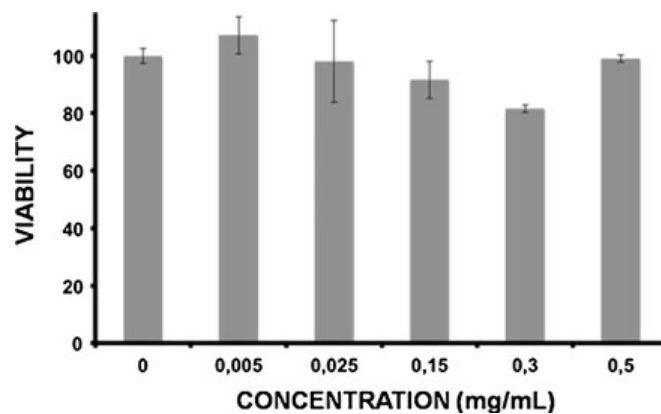
### Figures



**Figure 1:** TEM images of the CePO<sub>4</sub> nanoparticles prepared by aging at 120 °C for 1 h 0.004 M Ce(acac)<sub>3</sub> and 0.15 M H<sub>3</sub>PO<sub>4</sub> solutions in EG using a conventional (a) and microwave oven (b).



**Figure 2:** Excitation ( $\lambda_{em} = 542 \text{ nm}$ ; top) and emission ( $\lambda_{ex} = 255 \text{ nm}$ ; bottom) spectra of the  $\text{Tb}_{0.02}\text{Ce}_{0.98}\text{PO}_4$  sample obtained by MW heating. The emission spectrum of the  $\text{Tb}_{0.15}\text{Ce}_{0.85}\text{PO}_4$  sample synthesized by conventional heating is also included (bottom). (The latter showed the maximum intensity among the Tb doped samples (2-15% Tb) prepared by conventional hating).



**Figure 3:** Cytotoxicity profiles of the  $\text{Tb}_{0.02}\text{Ce}_{0.98}\text{PO}_4$  nanoparticles with VERO cells as determined by MTT assay. Percentage of viability of cells was expressed relative to control cells ( $n = 5$ ). Results are represented as mean  $\pm$  standard deviations