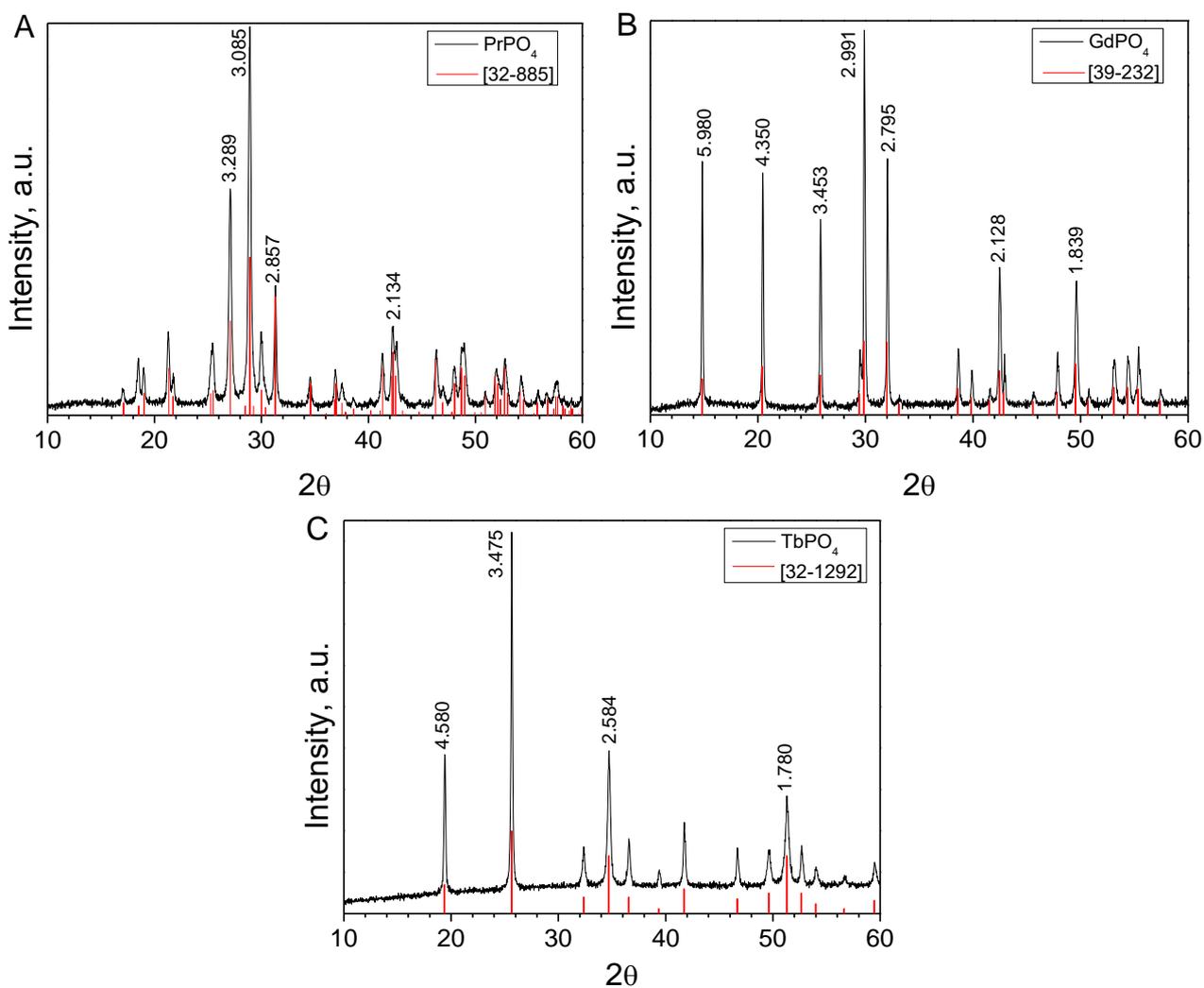
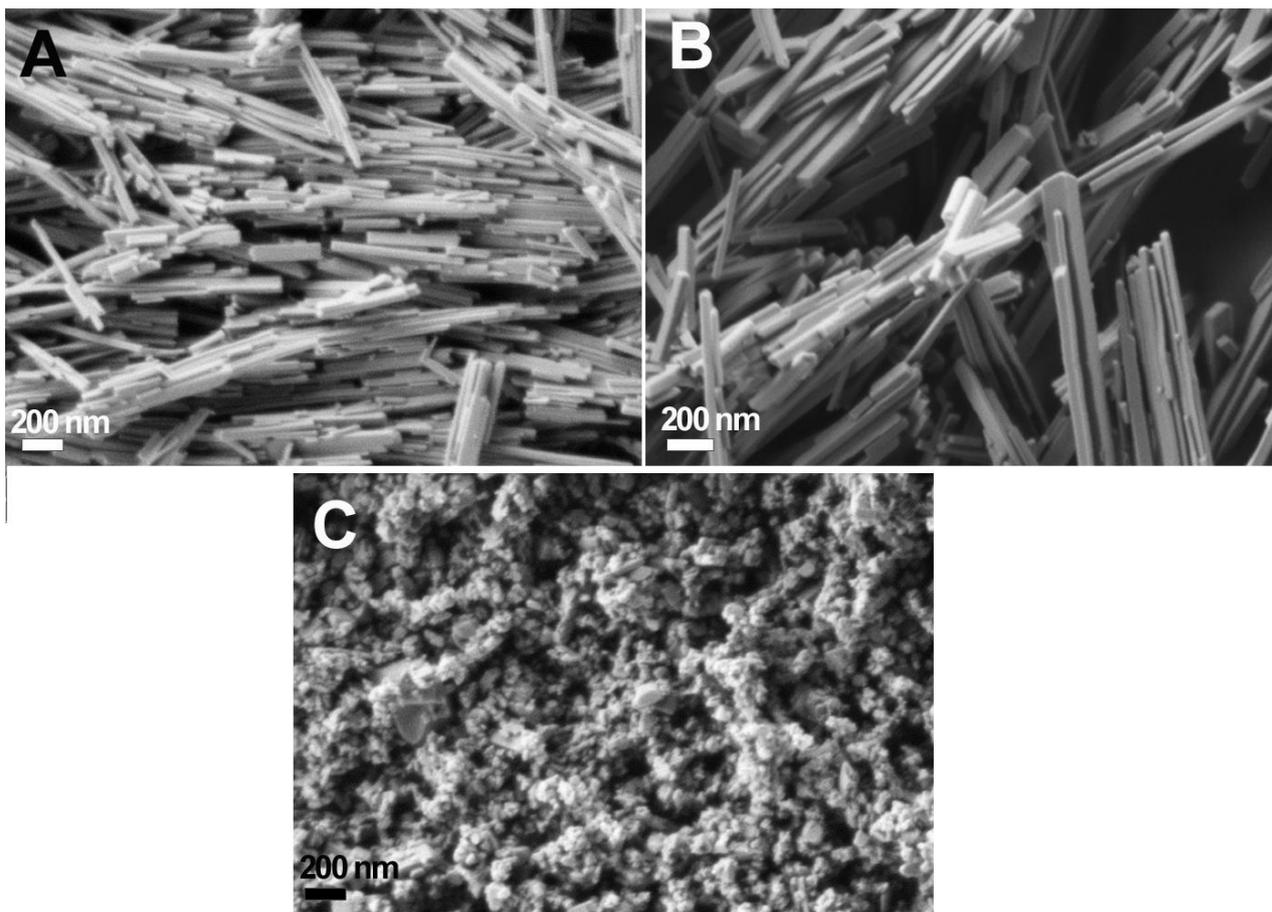


## Sorption of Am<sup>III</sup> onto orthophosphates of the rare-earth elements with different crystal structures

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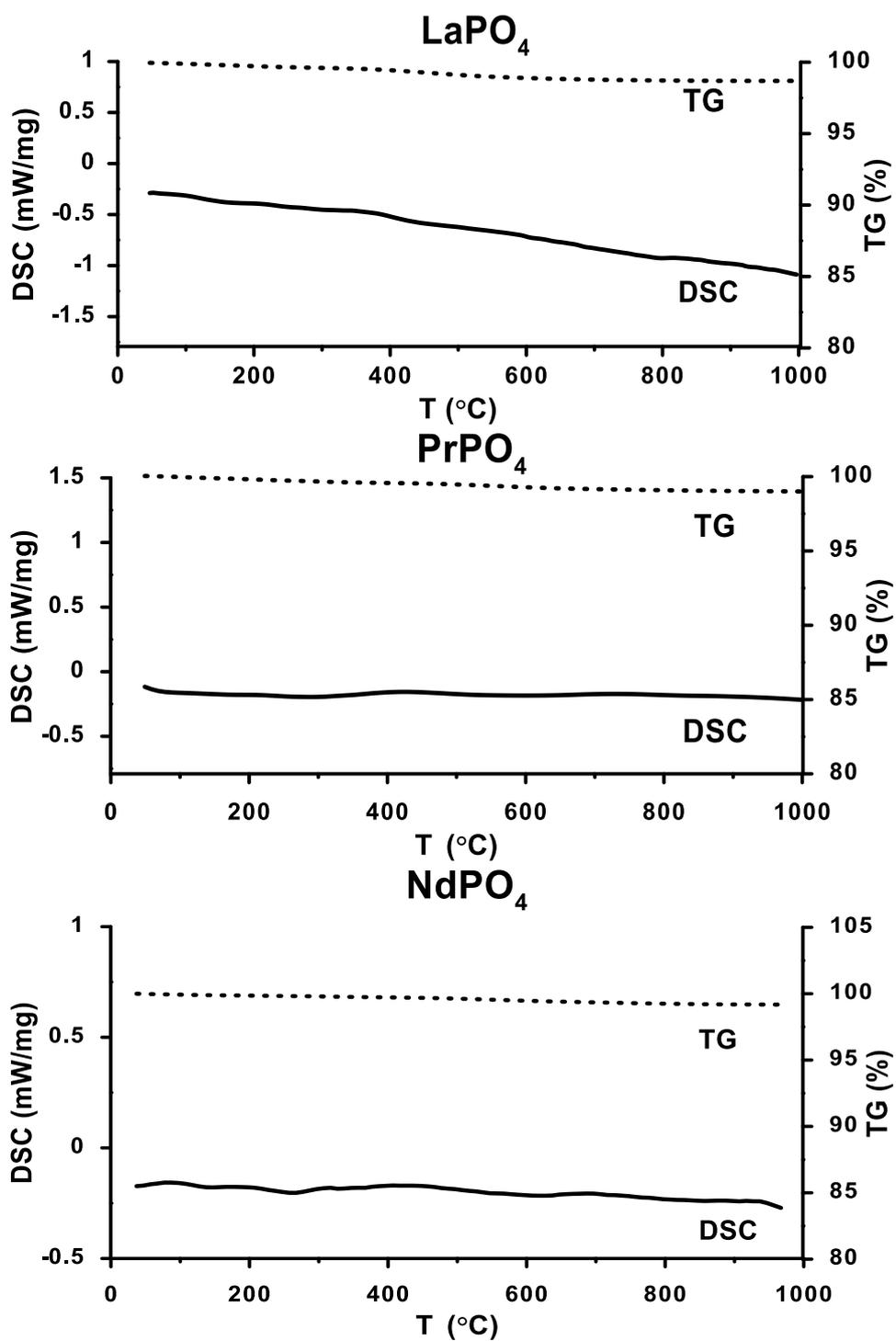


**Figure S1** XRD data for (A) – monoclinic, (B) –hexagonal and (c) – tetragonal structured LnPO<sub>4</sub>.

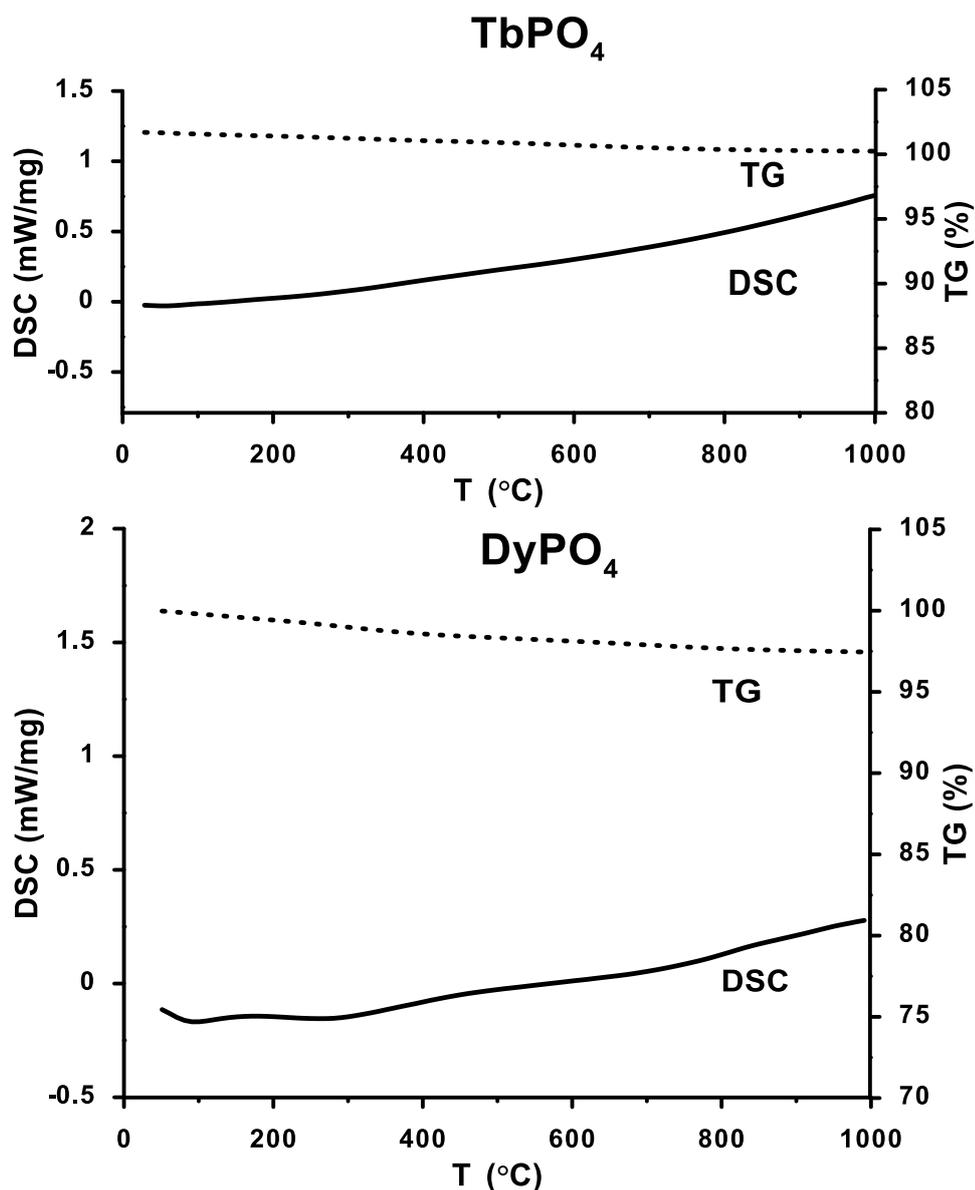


**Figure S2** SEM images of the obtained (A) – monazite-type PrPO<sub>4</sub>, (B) – monazite-type NdPO<sub>4</sub>, (C) – xenotime-type DyPO<sub>4</sub> by hydrothermal treatment.

Figures S3 and S4 demonstrate the absence of water in the lanthanide orthophosphates with the monoclinic and tetragonal structures. The small baseline drift and a monotone mass decreases during heating of the samples are related to the sensor “floating” in a gas flow when the temperature rises.

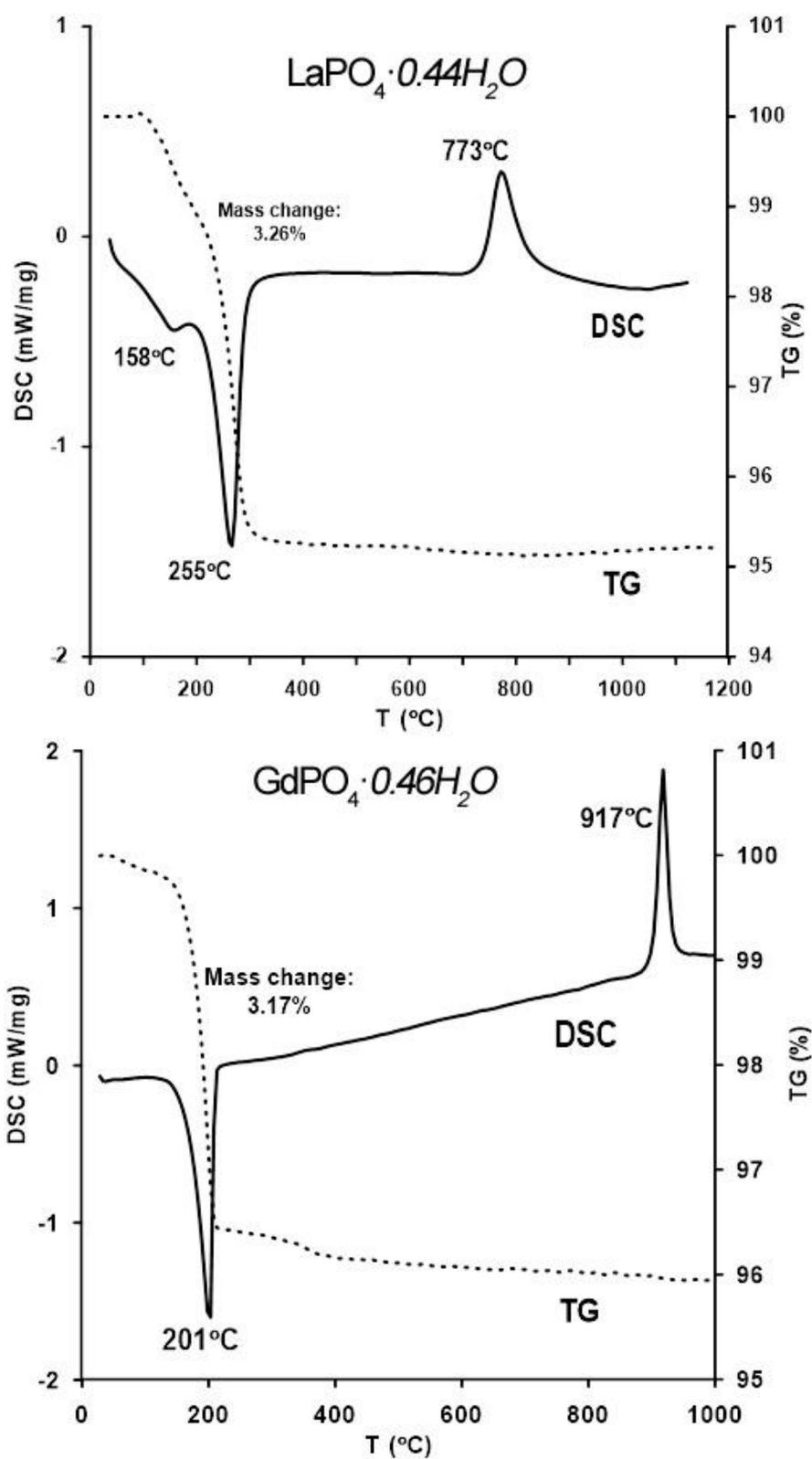


**Figure S3** DSC/TG plots of the lanthanide orthophosphates with the monoclinic phase (Ln=La, Pr, Nd).



**Figure S4** DSC/TG plots of the tetragonal-phase lanthanide orthophosphates (Ln=Tb, Dy).

Figure S5 permits to determine the composition of the lanthanide orthophosphates  $\text{LnPO}_4 \cdot x\text{H}_2\text{O}$  with the hexagonal structure (Ln= La, Gd). Samples were heated up to 1100°C. Based on TG study the following compositions were calculated:  $\text{LaPO}_4 \cdot 0.44\text{H}_2\text{O}$  and  $\text{GdPO}_4 \cdot 0.46\text{H}_2\text{O}$ . DSC study of  $\text{LaPO}_4 \cdot 0.44\text{H}_2\text{O}$  sample revealed the endothermic double-maximum peak in the temperature range from 110 to 280°C. These two peaks can be applied to evaporation of hydrate (maximum at 158°C) and adsorbed (maximum at 255°C) water of the orthophosphate. DSC study of  $\text{GdPO}_4 \cdot 0.46\text{H}_2\text{O}$  sample revealed the endothermic one-maximum peak at temperature 201°C corresponding to adsorbed water. An exothermic effect at temperatures 773°C and 917°C (for La and Gd, respectively) are not attended the weight change. It is associated with transformation of the hexagonal into monoclinic phase.



**Figure S5** DSC/TG plots of the lanthanide orthophosphates with the hexagonal structural form (Ln= La, Gd).