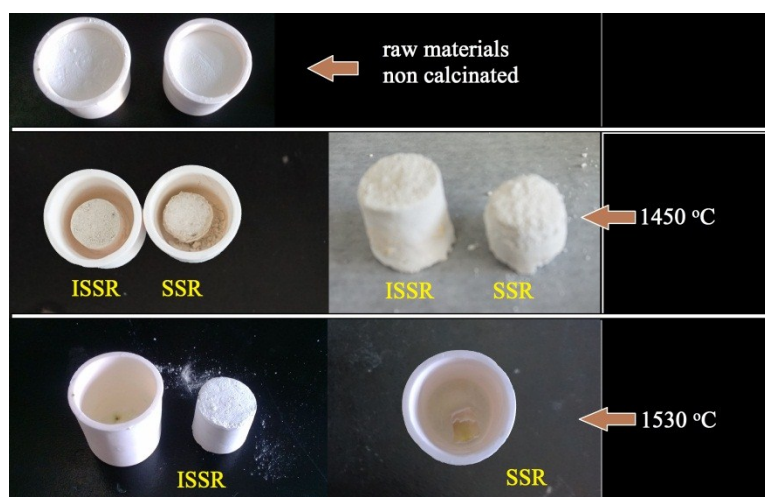


# A convenient and efficient synthesis method to improve the emission intensity of rare earth ions doped phosphors: the synthesis and luminescent properties of novel SrO:Ce<sup>3+</sup> phosphor

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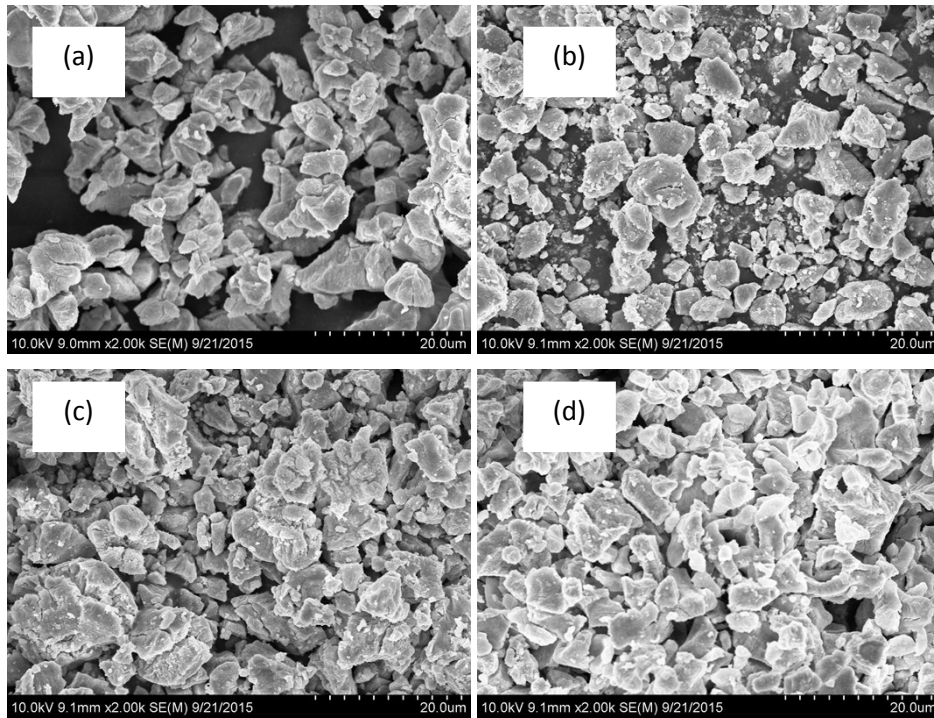
## 1. Photographs of the samples synthesized by SSR and ISSR.



**Figure s1** photographs of the samples synthesized by SSR and ISSR. The raw material is SrCO<sub>3</sub>.

The photographs shown in figure 1s are the appearances of the samples synthesized by SSR and ISSR. It is shown that when the temperature is higher than 1430 °C, the product, Ce<sup>3+</sup> doped SrO, synthesized by traditional SSR is beginning to volatilize. If the temperature reaches 1530 °C, for SSR there is little product can be left.

## 2. SEM photos of the samples



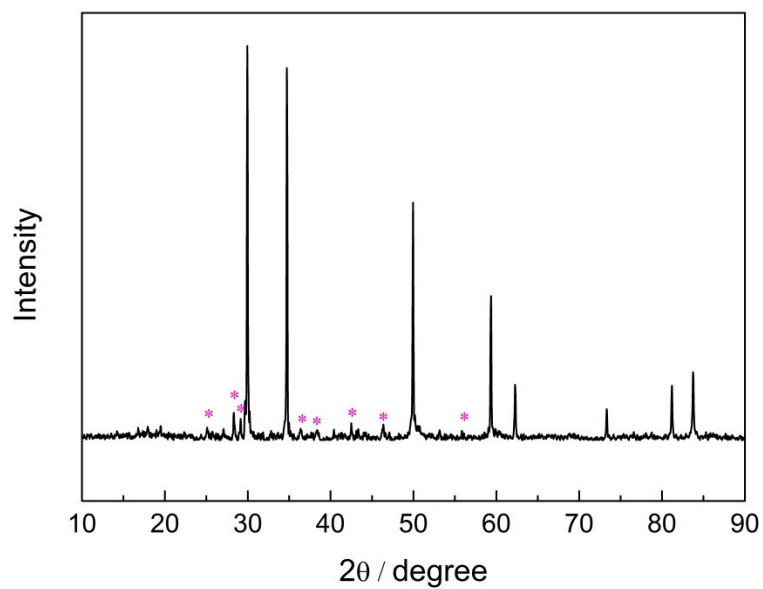
**Figure 2s** SEM photos of the samples synthesized by ISSR (a, c) and SSR (b, d) at 1450 °C and 1530 °C.

Because SSR and ISSR are both solid state reaction, the particle size is very big or they are aggregated to form a bulk. Therefore, particle size is not the main influence for the PL intensity. Furthermore, when we perform the SEM, the particle size is depending on the hand grinding process. We deduce that the reducing of crystal defects due to the higher reaction temperature may be a possible cause. However, due to the complexity of solid state reaction, the possibilities need more experimental confirmations.

## 3. The XRD pattern of the sample after exposed in air for 24 hours.

SrO is unstable in air, however it is not as unstable as we expected. When the sample was putted in air for 24 hours, the sample generally expanded. The XRD (after exposed in air for 24Hour) shows that there are some peaks which belong to  $\text{Sr}(\text{OH})_2$  and  $\text{SrCO}_3$ . Additionally, if the sample exposed in wet air, it will be decomposed totally and no emission can be seen anymore. However, in our case, in the common indoor environment the

decomposition is relatively slow. From the point of chemical equilibrium, we deduced that the outer decomposer will protect the core structure at a certain degree and slow down the speed of decompose process.



**Figure 3s** the XRD pattern of the sample when it was putted in air for 24 hours. The peaks indicated by circles belong to  $\text{Sr}(\text{OH})_2$  and  $\text{SrCO}_3$ .