

SYNTHESIS OF NANOCRYSTALS OF $\text{KRE}(\text{WO}_4)_2$ (RE=Gd,Yb) BY MODIFIED PECHINI METHOD.

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$\text{KRE}(\text{WO}_4)_2$ (RE= Gd and Yb) transparent nanocrystalline powder have been obtained by the modified Sol-Gel Pechini Method. KREW (RE= Gd, Y, Yb and Lu) have been reported in the bibliography of the last years as a interesting and promising solid state laser materials ^[1]. Laser action in ytterbium doped tungstates has been efficiently achieved, currently conforms an interesting alternative to Nd:YAG applications and it is already the active laser crystal in a commercial laser ^[2]. Traditionally, KREW ($\text{KRE}(\text{WO}_4)_2$) bulk crystals have been prepared by Top Seeded Solution Growth, *TSSG* method. Up to our knowledge, KREW tungstates have been not prepared as nanocrystals.

In 1967, Pechini ^[3] developed a three-stage process for the preparation of the precursor polymeric resin, first, a mixture of cations is formed in an organic complexing agent (citric acid or EDTA) and ethylene glycol solution; secondly the cations become a chelate. Third, the polymeric resin forms and the decomposition of this polymer happens at 523 K. The precursor resin powder for KREW has been calcinated at the range of temperatures between 873-973 K during maximum of 5 h. Figure 1. Shows the flow diagram of the used modified Pechini method for KREW synthesis.

X-Ray powder analysis and differential thermal analysis (DTA) have been used to study the transformation from amorphous powder into a crystalline monoclinic phase. Scherrer formula has been used to confirm the grain sizes that were visualised by SEM. Figure 2 shows the aspect of the nanocrystals.

¹ A.A. Kaminskii, Crystalline Lasers, Physical Processes and Operating Schemes, Laser and Optical Science and Technology Series, CRC, Boca Raton, 1996.

² Krueger A., Féru P. Photonics Spectra March 2004. <http://www.photonics.com>

³ Pechini M.P. , US Patent No.3.330.697, July 11 (1967).

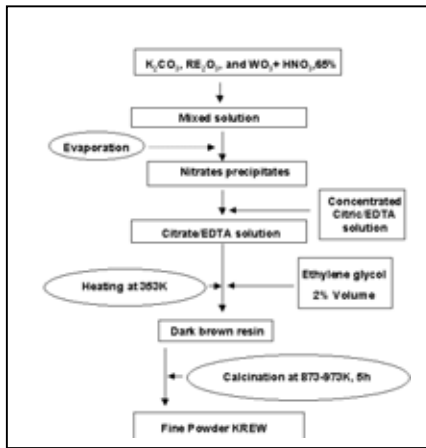


Figure 1. Flow diagram of modified Pechini

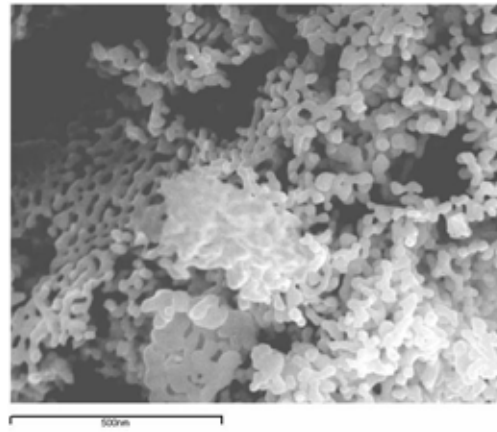


Figure 2. SEM photograph of KREW nitrates

References