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$KYb(WO_4)_2$ nanocrystals: Synthesis and optical characterization.

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$KYb(WO_4)_2$ (From now KYbW) nanocrystalline powder have been obtained by the modified Sol-Gel Pechini Method. 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 [1].

In 1967, Pechini [2] 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 ethylenediaminetetracetic) 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 powder for KYbW has been calcinated at the range of temperatures between 873-973 K during maximum of 5 h. in order to obtain KYbW nanocrystals in the size range of 20-200 nm. Up to our knowledge, KYbW tungstates have been not prepared as nanocrystals till now [3]. X-Ray powder analysis and differential thermal analysis (DTA) have been used to study the transformation from precursor powder into a crystalline monoclinic phase. Scherrer formula has been used to confirm the grain sizes that were visualised by SEM and TEM (figure1).

Optical absorption and luminescence measurements of KYbW nanocrystals are compared with bulk data [4]. Figure 2 shows the room temperature luminescence of KYbW nanocrystals.

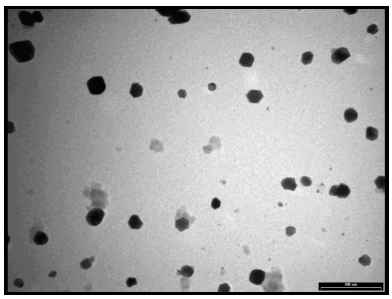

Figure 1.- TEM photograph of KYbW nanocrystals

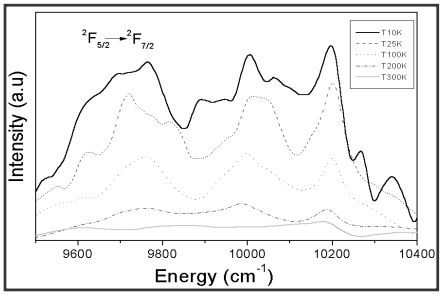

Figure 2.- Optical Emission of KYbW nanocrystals

References:

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

[2] M. P.Pechini , *US Patent* No.3.330.697,July 11, **1967**.

[3] M. Galceran; M.C. Pujol; M. Aguiló and F. Díaz, "Sol-Gel Pechini method for obtained $KRE(WO_4)_2$ (RE=Gd and Yb)", submitted to *Chemistry of Materials*, **2006.**

[4] M. C. Pujol; M. A. Bursukova; F. Guell; X. Mateos; R. Solé; Jna. Gavaldà; M. Aguiló; J. Massons; F. Díaz; P. Klopp; U. Griebner and V. Petrov, *Physical Review*, **2002**, *65*, 165121.