Low temperature synthesis of mechanoluminescent material

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Introduction

Mechaneoluminescent materials have been synthesized at high temperatures such as $SrAl_2O_4$: Eu^{+2},Dy^{+3}, $BaAl_2O_4$:Eu^{+2} and $SrAl_2O_4$:Tb^{+3}. These synthesis methods cause large energy loss and therefore, we focused on a mechanoluminescent material synthesis at a low temperature and with methods. Theory behind the mechanoluminescence is still not fully discovered. It is believed that this property is related to the asymmetric crystal structure. Crystal bonds are broken along planes with opposite charge, and when they re-connect, light is emitted. This light is emitted as the charges pass through the separations created from the fracture. In this research we have synthesized Europium based Dibenzoylmethidetriethylammonium[1)] mechanoluminescent materials at 70°C.

Experimental

Precursor solution was prepared using Ethanol, 1,3-Diphenyl-1,3-propanedione, europium(iii) nitratehexahydarte and triethylamine. Then, the solution mixture was vigorously stirred at 70°C on the hot plate until substances are completely dissolved. Then, it was inserted into a Thermos and tightly capped and left cooled down slowly overnight. Then, the solution contained beaker was taken out and washed with ethanol.

Result and discussion

Produced mechanoluminescent nanomaterial shows a strong mechanoluminescence after UV light irradiation as show in Fig. Obtained materials are characterized by SEM, XPS and XRD.

Reference

1. C.R. Hurt et al., High Intensity Triboluminescence in Europium Tetrakis (Dibenzoylmehide)-triethylammonium, Nature **1996**, 212 (5058), 179.

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