Contribution ID: **1198** Type: **Poster (Student, Not in Competition) / Affiche (Étudiant(e), pas dans la compétition)**

Electron spin resonance spectra of strontium aluminate at high microwave fields and strong illumination

Tuesday 14 June 2016 19:44 (2 minutes)

Strontium aluminate co-doped with europium and dysprosium [SrAl2O4(Eu2+,Dy3+)] is a popular long-lasting (˜10 hrs) phosphor for security signs, medical diagnostics, and other applications. Although it has been 20 years since the discovery of persistent luminescence (PL) in SrAl2O4(Eu2+,Dy3+), the associated physical mechanism is still unclear. Electron spin resonance (ESR) is a powerful technique to investigate the excitation of paramagnetic centers in solids, and the associated energy transfer processes. It was previously observed [1] that the intensity of the ESR signal of SrAl2O4(Eu2+,Dy3+) decreases under illumination and is restored upon remission of light during PL, a phenomenon that has been taken as evidence of the transformation of ESR-active Eu2+ centers into diamagnetic Eu3+ under illumination, and their recovery upon PL remission. Here, we present the ESR spectra of SrAl2O4(Eu2+,Dy3+) in the X microwave band, in the dark and under illumination by violet (405 nm) light. At high enough microwave field or sufficiently long and intense illumination, a "negative" ESR signal is observed, which, clearly, cannot be associated to negative concentrations of Eu2+ centers. Our findings put in question the validity of the current interpretation of the ESR spectra and PL mechanism in SrAl2O4 (Eu2+,Dy3+). We propose that the transformation of the ESR spectra at high microwave power and under illumination is due to dephasing of the ESR signal as a consequence of extremely long spin-lattice relaxation times in (Eu2+,Dy3+)SrAl2O4, a phenomenon that may also be responsible to persistent luminescence.

[1] Clabau, Frédéric, et al. Chemistry of materials 17.15 (2005): 3904-3912.

Author: LI, ye (uwo)

Co-authors: Dr AKBARI-SHARBAF, Arash (western university); FANCHINI, Giovanni (The University of Western Ontario); Mr MURPHY, Patrick (western university); Prof. ZHAO, yan (beihang university)

Presenter: LI, ye (uwo)

Session Classification: DCMMP Poster Session with beer / Session d'affiches, avec bière DPMCM

Track Classification: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)