

Photo- and X-ray luminescent diamond composites with integrated rare earth nanoparticles

Vadim Sedov

Sergey Kouznetsov, Artem Martyanov, Victor Ralchenko, Vitaly Konov
 Wonder Technologies LLC, Bolshoi bulv. 42, bld. 1, 143026 Moscow, Russia
sedovvadim@yandex.ru

Abstract

Thin-film diamond-based nanocomposites [1,2] with integrated Eu^{3+} -based and Ce^{3+} -based rare earth nanoparticles have been produced by chemical vapor deposition (CVD) technique to be used as a source of intensive photo- and X-ray luminescence. Photoluminescence (PL) spectra and the PL mapping of the spatial distribution of PL intensity on macro- and micro scale, that was performed using Horiba Jobin-Yvon LabRam HR800 instrument, revealed a highly uniform emission originated from the composite. Such PL studies served as the good method for pre-selection of composite samples before their study with expensive X-ray luminescence techniques. The developed composite material with mechanically strong, highly thermally conducting and transparent diamond matrix opens a way to use the diamond-fluoride composites as photo- and X-ray luminescent screens (scintillators) capable to withstand high photon fluxes.

References

- [1] Sedov, V. et al. *Diamond and Related Materials* 72 (2017) 47
- [2] Sedov, V. et al. *ACS Applied Nano Materials* 3.2 (2020) 1324

Figures

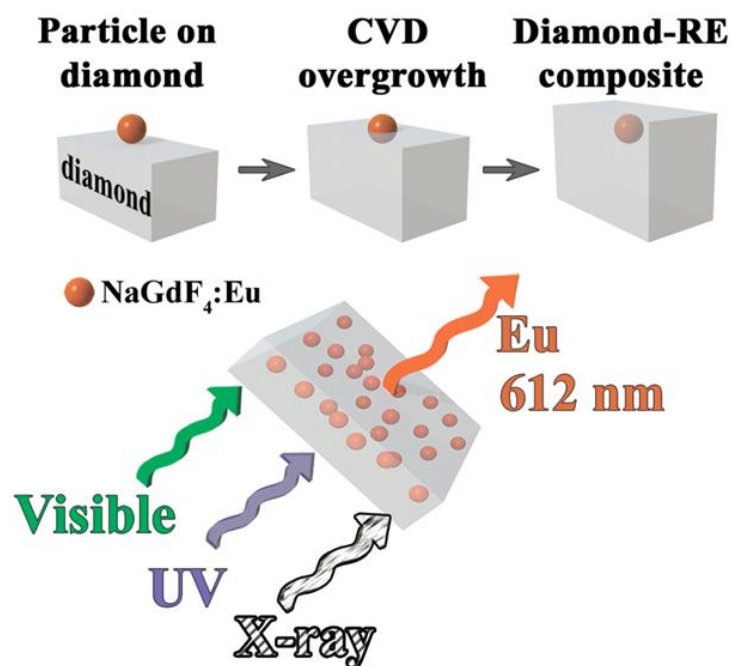


Figure: Diamond-RE composite materials: preparation and luminescence principle