

## Seminar : Dr. Daniel Rytz

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Friday June 19th, 2026 at 10h30  
LMOPS, CentraleSupélec, 2 rue E. Belin, Metz  
Salle du conseil

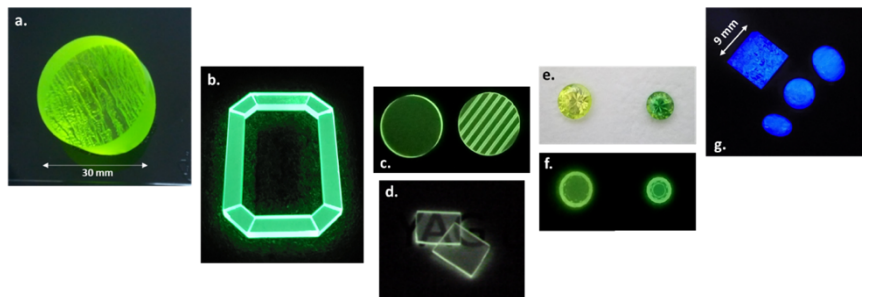
### Phosphorescent single crystals with tridymite or garnet structures



Persistent luminescence (PersL) is the emission of light for a time interval of seconds, minutes or hours after the excitation source has been turned off. PersL can be observed, for example, in Cu:BaS polycrystals obtained by heat treating the so-called Bologna stone discovered by an alchemist named V. Cascariolo in 1602, in the blue diamond purchased by the sun king Louis XIV from the explorer J.B. Tavernier in 1664 and now part of the collections displayed at the Smithsonian in Washington under the name Hope diamond, and in novel crystals known under various acronyms (BRG type 1, BRG type 2, BRB type 1, where type 1 are tridymites  $AEAl_2O_4$  with  $AE$  = alkaline earth, and type 2 is a garnet related to YAG) pioneered and developed by BREVALOR since 2013.

The PersL properties, sometimes also called phosphorescence, of these three examples of bulk crystals are related to those of “glow in the dark” pigments used in decorative artefacts and toys, displays, safety signs, watch dials, etc..., in certain cases known under the trade name Superluminova for powders or lacquers.

With the availability of the BRG and BRB single crystals mentioned above, it becomes possible to analyse PersL materials for the first time based on quantitative optical spectroscopy measurements thanks to the inherent transparency and unequivocal definition of the crystallographic and crystal-optical axes of the crystalline samples. Furthermore, their favourable mechanical properties make them suitable for special types of novel light effects, for example in gemstone-like cut samples with faceted and/or carved surfaces adapted to the PersL phenomenon. In addition, details will be provided on the growth of BRG type 1 ( $SrAl_2O_4$ ), BRG type 2 (garnet) and BRB type 1 ( $CaAl_2O_4$ ) crystals, as well as on their spectroscopic properties for specific combinations of dopants.



Phosphorescent single crystals, viewed in the dark after turning off the excitation source (except in case e.). a. PersL cylinder of diameter x length = 30 x 15 mm, BRG type 2 crystal of garnet type; b. faceted octagon with height x width x thickness of 40 x 25 x 2,5 mm made of BRG type 2; c. disks 7 x 5 x 1 mm and plates 7 x 5 x 1 mm made of BRG type 2 and type 1, respectively; e. gemstone doublets made of undoped (left) and green (right) YAG bonded to BRG type 1 (in daylight); f. same doublets as in e. viewed in the dark after turning off the excitation source; g. plate and cabochons made of BRB type 1.

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(Materials and Physics @ Ultimate Scale: Nanotech for a sustainable digital world)

