MS13-1-5 Solid solutions of mono and dihalogen alkyl phosphonium salt derivatives and their photoluminescence properties
#MS13-1-5

K. Saršuns [1], I. Kļimenkovs [1], A. Bērziņš [1], T. Rekis [1]
[1]**Faculty of Chemistry, University of Latvia - Riga (Latvia)**

Abstract
A neglected crystal engineering strategy that would allow to tune a variety of properties of a crystalline material in continuum is to obtain solid solutions. However, for organic systems, it has been observed that occasionally even very similar molecular entities cannot be interchanged in the crystal lattice. Up to date, there are only some rough, empirical guidelines indicating what kind of binary systems would possibly show component miscibility in the solid state. One type of binary systems deemed to form solid solutions is a system constituting two molecules differing by halogen atom type[1].
In this research work, halogenated alkyl phosphonium salts have been selected to attempt solid solution engineering. The compounds are known to exhibit long-persistent room-temperature solid-state luminescence phenomena[2].
We explored the solid solution formation in binary systems of mono and dihalogen alkyl phosphonium salt derivatives (**Figure 1.**). Solid solutions have been identified and characterized using powder X-ray diffraction and thermal methods of analysis. Photoluminescence spectra of the new crystalline phases were studied to explore the differences with respect to the luminescence properties of pure substances known from the literature[2].

References
(1) Corpinot M. K., Bučar D. K. A Practical Guide to the Design of Molecular Crystals. Crystal Growth & Design, 19(2), 1426-1453 (2019)

(2) Alam, P, Leung N. L. C., Liu J., Cheung T. S., Zhang X., He Z., Kwok R. T. K., Lam J. W. Y., Sung H. H. Y., Williams I. D., Chan C. C. S., Wong K. S., Peng Q., Tang B. Z. Two Are Better Than One: A Design Principle for Ultralong-Persistent Luminescence of Pure Organics. Adv. Mater., 32(22), 2001026 (2020)

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Molecular structures of mono (a) and dihalogen (b

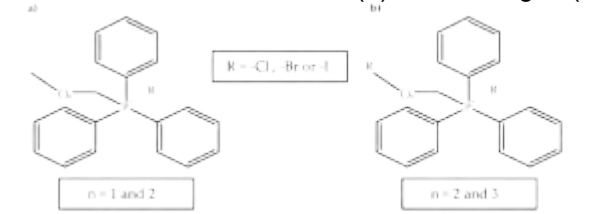

Figure 1. Molecular structures of mono (a) and dihalogen (b) alkyl phosphonium salt derivatives.