

MS30-1-6 Hydrogen-bonded organic frameworks based on luminescent rhenium octahedral cluster complexes
#MS30-1-6

D.I. Konovalov ¹, D.I. Konovalov ², E. Cadot ³, M.A. Shestopalov ⁴

¹Institut Lavoisier de Versailles, UMR 8180, UVSQ, Université Paris-Saclay - Versailles (France), ²Nikolaev Institute of Inorganic Chemistry SB RAS - Novosibirsk (Russian Federation), ³Institut Lavoisier de Versailles, UMR 8180, UVSQ, Université Paris-Saclay - Versailles (France), ⁴Nikolaev Institute of Inorganic Chemistry SB RAS - Novosibirsk (Russian Federation)

Abstract

Rhenium octahedral cluster complexes are compounds with common formula $[\{\text{Re}_6\text{Q}_8\}\text{L}_6]^n$ and set of interesting physical-chemical properties such as: (i) bright red luminescence at excitation by UV, visible, X-ray or electric current, (ii) photosensitivity properties, i.e. the ability to transfer the energy of the excited cluster state to triplet oxygen, thus converting it into a highly active singlet form, as well as (iii) high radiodensity properties due to the high local concentration of heavy atoms in the cluster core. The presence of such properties, which are certainly promising from a practical point of view, makes it possible to predict the possibility of using such compounds both in an individual form and as components for the creation of functional materials in various fields from sensorics to biomedicine.

Substitution of apical halide ligands in $[\{\text{Re}_6\text{Se}_8\}\text{X}_6]^{3-}$ (X = Cl, Br) by benzimidazole (bimzH) accompanied by a self-assembly process leads to the formation of microporous Re_6 - based hydrogen-bonded organic frameworks (**Re₆-HOFs**) constructed on N–H···X hydrogen bonds and π – π -stacking interactions between bimzH ligands. **Re₆-HOFs** demonstrate sorption properties with a Brunauer–Emmett–Teller surface area of up to $443 \text{ m}^2\text{g}^{-1}$ and luminescence with a quantum yield and an emission lifetime of up to 0.16 and 16 μs , respectively. The compounds obtained complement small groups of transitionmetal cluster-based HOFs, which are a perspective for the development of multifunctional frameworks.

