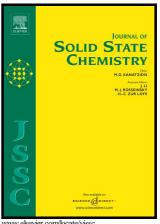
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Structural diversity of alkali metal coordination polymers driven by flexible biphenyl-4,4'-dioxydiacetic acid

Renata Łyszczek^a*, Halina Głuchowska^a, Liliana Mazur^a, Bogdan Tarasiuk^b, Vasyl Kinzhybalo^c, Alexander M. Kirillov^d

^aDepartment of General and Coordination Chemistry, Faculty of Chemistry, Maria Curie-Skłodowska University, M.C. Skłodowskiej Sq. 2, 20-031 Lublin, Poland

^bFaculty of Chemistry, Maria Curie-Skłodowska University, M.C. Skłodowskiej Sq. 2, 20-031 Lublin, Poland

^cInstitute of Low Temperature and Structure Research, Polish Academy of Sciences, Okólna 2, 50-422 Wrocław, Poland

^dTechnical University of Lisbon, Rovisco Pais, 1049-001 Lisbon, Portugal

Abstract

A new series of four coordination polymers of alkali metals (Li, Na, and K) was assembled from a poorly explored building block, biphenyl-4,4'-dioxydiacetic acid (H_2L), and characterized by FTIR-ATR, TG-DSC, elemental analysis, and single crystal X-ray diffraction methods. The obtained structures range from 2D coordination polymers [$Li_2(\mu-L)(\mu-H_2O)_2(H_2O)_2$] (1) and [$Na_2(\mu_4-L)(\mu-H_2O)_2(H_2O)_2$] (2) to 3D metal-organic frameworks [$Na_2(\mu_6-L)(\mu-H_2O)_2$] (3) and [$K_2(\mu_{10}-L)$] (4). The influence of metal ionic radii on the crystal structures of the coordination polymers and conformation of the flexible biphenyl-4,4'-dioxydiacetate ligand was analyzed. Structural complexity increases within the series of products 1-4 following the Li < Na < K trend, accompanied by the evolution of the coordination modes of biphenyl-4,4'-dioxydiacetate ligand from the μ_2 - L^2 - (1) and μ_4 - L^2 - (2) to μ_5 - L^2 - (3) and μ_{10} - L^2 - (4). Topological classification of the simplified underlying metal-organic networks in 1-4 was performed, disclosing the hcb (1), 3,4L13 (2), and fit (4) topological networks, whereas a topologically unique framework was identified in 3. The obtained coordination polymers are thermally stable and decompose in one (4) or several stages (1-3) forming metal carbonates and/or oxides as final decomposition products. The obtained products 1-4 represent the first

^{*}Corresponding author. renata.lyszczek@poczta.umcs.lublin.pl

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