

LINEAR METAL ATOM CHAINS OF RH (I) WITH VARIOUS BIPYRIDINE LIGANDS

^{1,2}*Chernysheva M.V.*, ³*Laurila E.*, ²*Haukka M.*

¹Lomonosov Moscow State University of Fine Chemical Technologies, Vernadskogo prospect 86, 119571 Moscow, Russia. E-mail: mitht@mitht.ru

²University of Jyväskylä, Ylistönrinne (YK), Survantie 9, 40014 Jyväskylä, Finland

³Chalmers University of Technology, Department of Chemical and Biological Engineering, SE-412 96 Göteborg, Sweden

Extended one-dimensional metal atom chains are not new but they still attract much attention due to their versatile properties, such as magnetism and conductivity, as well as photophysical and catalytic properties. These properties are influenced by metal-metal interactions, which vary from strong covalent metal-metal bonds to weaker non-covalent metallophilic interactions.

There are two principal approaches to obtain metal atom chains: through linking ligands or through direct metal-metal interactions. In the first case the supporting ligand can hold the metal centers close enough in order to form a linear structure, even if there are no true metal-metal bonds. But on the other hand, the denticity of the ligand may limit the metal chain's length. We are mostly interested in the second approach, according to which linear arrays consist of stacked square planar metal complexes. The advantage of this type of systems is the absence of limitations in chain's length. Krogmann's and Magnus' green salts are classic examples of stacked platinum compounds revealing conducting properties. Our research group has proved that such Magnus green salt type systems can be constructed using rhodium complexes, as well [1-3]. The obtained rhodium-based double-salt chain $[\text{Rh}(2,2'\text{-bpy})(\text{CO})_2][\text{RhCl}_2(\text{CO})_2]$ is shown in Fig.1.

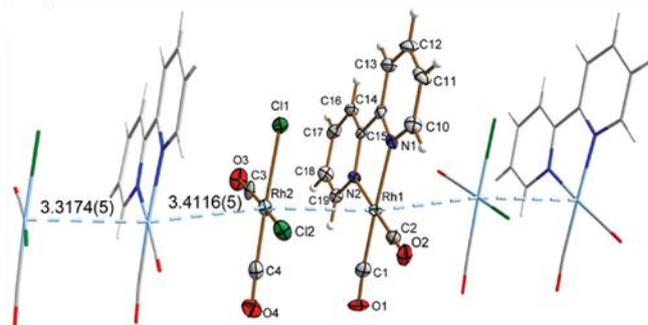


Fig.1. The thermal ellipsoid plot of $[\text{Rh}(2,2'\text{-bpy})(\text{CO})_2][\text{RhCl}_2(\text{CO})_2]$ (at 100 K) at 50% probability level with the next two these complexes [1].

We have synthesized ionic and neutral chains constructed of Rh(I) complexes with various 4,4'-R₂-2,2'-bipyridine ligands where R = Me, Ph, Hal, NO₂, NH₂, COOH, OH, CN (see Fig.2) and analyzed the impact of electron withdrawing and donating substituents on the complexes' properties such as Rh••Rh distance, metallic luster, absorption properties and conductivity.

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2. E. Laurila, L. Oresmaa, M. Niskanen, P. Hirva, M. Haukka. Metal-Metal Interactions in Stacked Mononuclear and Dinuclear Rhodium 2,2'-Biimidazole Carbonyl Complexes. *Crystal Growth & Design*, Vol. 10, No. 8, 2010. 3775-3786.
3. E. Laurila, R. Tatikonda, L. Oresmaa, P. Hirva, M. Haukka. Metallophilic interactions in stacked dinuclear rhodium 2,2'-biimidazole carbonyl complexes. *CrystEngComm*, 14, 2012. 8401-8408.