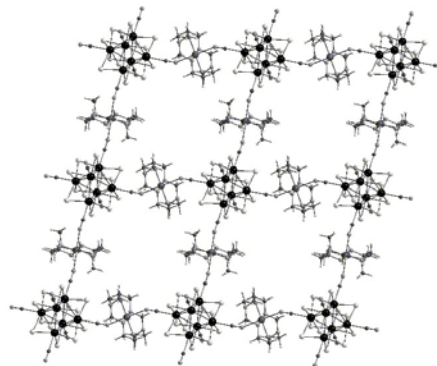


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**Assembly of Cluster-based Inorganic-Organic Architectures Built of Octahedral Niobium Cyanochloride Clusters and Transition Metal Complexes.** Abdessadek Lachgar, Zhihua Yan, Dept. of Chemistry, Wake Forest Univ., Winston-Salem, NC 27109.

Edge-bridged octahedral  $[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6]^{4-}$  clusters and metal complexes are used as building units of materials with extended framework. The clusters have been chosen for their well defined shape and coordination, large size and electronic flexibility, and their stability in a variety of solvents. Reactions between aqueous solution of  $\text{K}_4[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6]$  and solution of  $\text{Cu}(\text{cyclam})(\text{ClO}_4)_2$  (cyclam=1,8-dimethyl-1,3,6,8,10,13-hexaazacyclotetradecane) in acetonitrile yields dark-green plate-like crystals  $[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6][\text{Cu}(\text{cyclam})]_2 \cdot 2\text{CH}_3\text{CN} \cdot 2\text{H}_2\text{O}$  (1) (triclinic system, P-1,  $a = 9.092(1)\text{\AA}$ ,  $b = 13.037(2)\text{\AA}$ ,  $c = 13.502(2)\text{\AA}$ ,  $\alpha = 95.68(0)^\circ$ ,  $\beta = 96.43(0)^\circ$ ,  $\gamma = 95.96(0)^\circ$ ). Compound 1 has 2D neutral framework that consists of  $[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6]^{4-}$  cluster anions



and  $[\text{Cu}(\text{cyclam})]^{2+}$  complex cations linked through cyanide ligands to form layers that stack perfectly along the  $a$  crystallographic axis. Reaction between solution of  $\text{K}_4[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6]$  in DMF and  $\text{Ni}(\text{cyclam})(\text{ClO}_4)_2$  in acetonitrile leads to the formation of  $\text{K}_4[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6][\text{Ni}(\text{cyclam})(\text{CN})_2] \cdot x\text{DMF}$  (2) (monoclinic, C2/m,  $a = 23.967(2)\text{\AA}$ ,  $b = 13.516(1)\text{\AA}$ ,  $c = 13.047(1)\text{\AA}$ ,  $\beta = 106.16(0)^\circ$ ). The structure of 2 consists of  $[\text{Nb}_6\text{Cl}_{12}(\text{CN})_6]^{4-}$  cluster anions and neutral  $(\text{Ni}(\text{cyclam})(\text{CN})_2)$  neutral complexes linked to each other through  $\text{K}^+$  cations to form a hybrid inorganic-organic framework with a complex 3D structure.