

Superior Adsorbents for Aerospace Applications

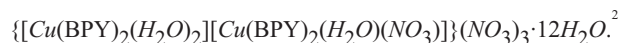
by Jack Y. Lu

SYNTHESIS OF FUNCTIONAL MATERIALS REPRESENTS ONE OF the current challenges in chemical research. The metal-organic polymers have been found to have a wide range of applications such as molecular separation and pollution prevention in air, liquid and water systems, where they can be used as ion exchangers and molecular sieves. The objective of the proposal is a design and synthesis of new superior adsorbents that can be used to protect aerospace personnel from unhealthy environments.

Experimental Activity, Results and Discussion

Among the polymeric materials synthesized in our laboratory, $[Cd(NA)_2]_n$, a new two-dimensional coordination polymer, has been synthesized under hydrothermal reaction conditions. The two-dimensional networks (Fig. 1) show a paired stacking arrangement and define how 2-D networks are stabilized via interdigitation and π - π interactions.

$[Cu(BPY)(NO_3)_2]_n$ was reacted with additional 4,4'-bipy, resulting in a new self-assembled metal-organic network structure featuring the first two-fold interpenetrating 3-D 4².8⁴ network structure:



The two independent 3-D networks in this compound, when minimally interpenetrating, enable this 3-D open-channel structure to accommodate a large amount of water molecules and nitrate anions. Such inclusion phenomena in interpenetrating open-frameworks are very suggestive of practical applications, especially in those open-channel structures with minimum interpenetrating frameworks (Fig.2).

References

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²J. Y. Lu, A. A. Fernandez, Zh. Ge, and K. A. Abboud, "A Novel Two-Fold Interpenetrating 3-D 4².8⁴ Network Self-Assembled from a New 1-D Coordination Polymer," *New J. Chem.* 29 (2005): 434-38.

Publications

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ABSTRACT— Superior adsorbents have been important topics in current chemical and materials research because they have been found to have a wide range of applications. Research on adsorbents focuses on the rational design and synthesis of new materials that can be used for space applications. The development of a new two-

dimensional coordination polymer indicates the potential of UHCL laboratories.

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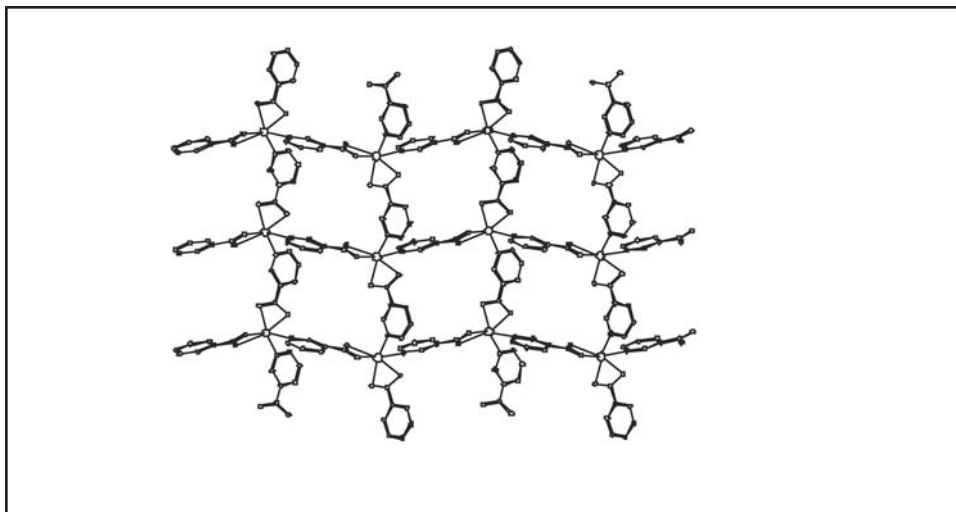


Fig. 1. Non-perspective view of a section of the 2-D plane of the structure.

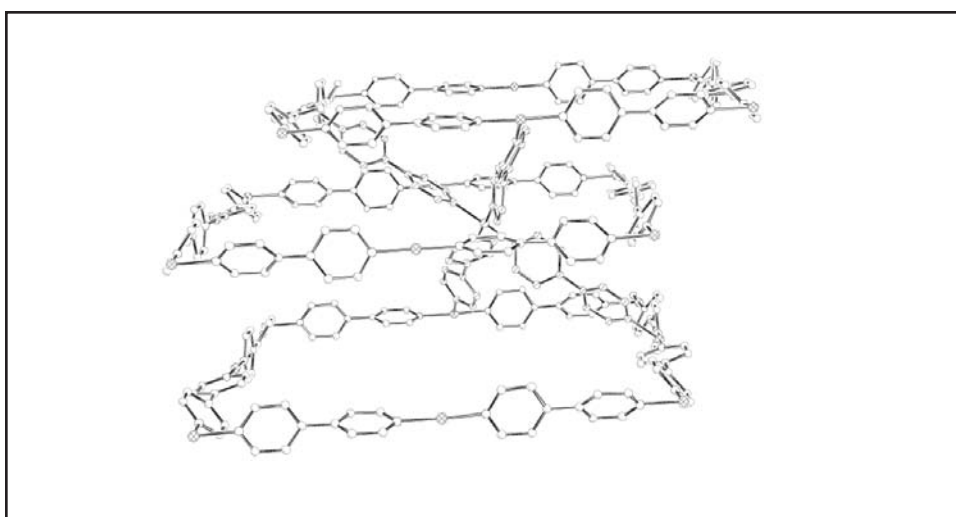


Figure 2. View of the 3-D open-framework linkages in complex 2. The “bending” part of the square-grid is differentiated from copper atoms dispersed throughout the model.

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