IOCG 2025 Conference
The 1st International Online Conference on Gels
03–05 December 2025 | Online

Structural properties of supramolecular metallogel derived from vanadium and hydrazone ligand: Metallogelation triggered by hydrogen bonding, pi-pi-interactions and other non-covalent interactions

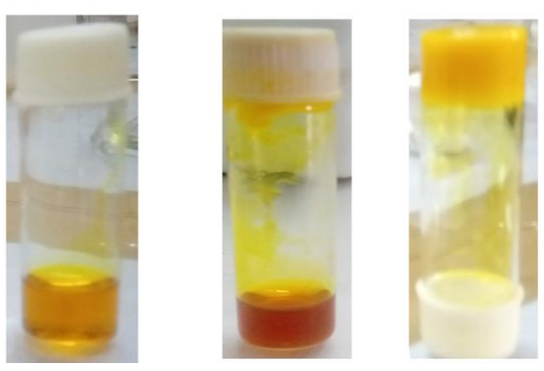
Sunshine Dominic Kurbah (Email: kurbahsun@gmail.com)
Department of Chemistry, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Eraligool-788723, Sribhumi, Assam, India

Introduction

The Metal ions cause small molecules to self-assemble and form metallogels in situ. The ligand, metal ions and then solvent molecules combined together to form an entangled networks. This network is supported by different variety of dynamic and reversible processes such as metal coordination, non-covalent interactions, including hydrogen bonding, π-π interactions and solvophilic interactions.

Method

Metallogelation experiment was carried out by using different solvents combination. In the first step the vanadium precursor was made to react with the ligand. The resulting mixture was dissolved in 2 mL of water/ethanol (2:8; v/v) and sonicated for 10 min to get a clear solution. The brown coloured solution turned yellow and the solution was kept undisturbed at room temperature until the gelation process complete. Then, the formation of the gel was confirmed by the glass vial inversion method (Scheme 1)



Scheme 1. Gelation experiment

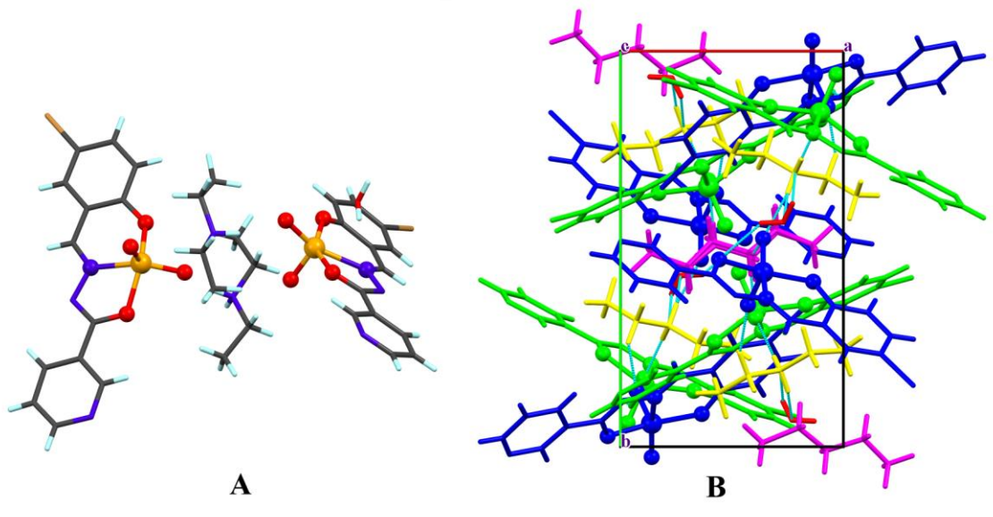


Figure 1. A) Crystal structure of the metallogel (VLM); B) Packing diagram along c axis.

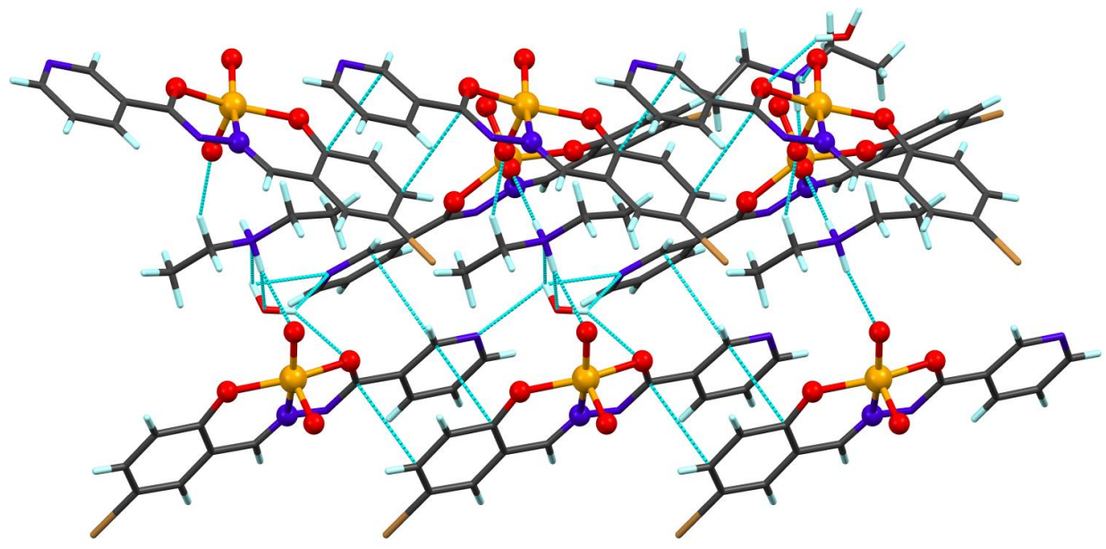


Figure 2. Structure of metallogels showing hydrogen bonding and π-π interactions

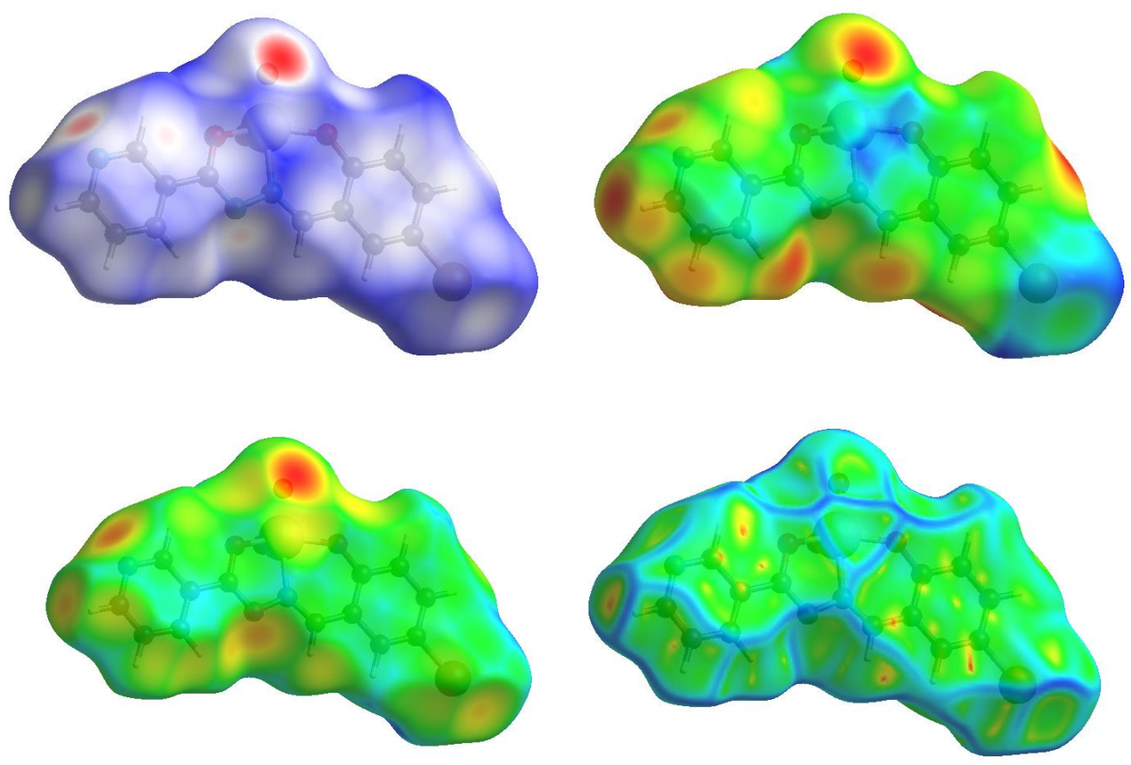


Figure 3. Hirshfeld surfaces of VLM with a variety of properties mapped onto the surface (d_{norm}, d_i, d_e and $d_{curvedness}$)

Conclusion

In conclusion, a new vanadium based metallogels was successfully synthesized and characterized. The metallogel shows excellent gelation ability with 1.7 wt% minimum gelator concentrations. The crystal structure of the metallogel shows the presence of various interactions such as hydrogen bonding, pi-pi-interactions and other weak non-covalent interactions which stabilised the structure of the metallogels.

References

1. Aldebert, P.; Baffier, N.; Gharbi, N.; Livage, J. Layered structure of vanadium pentoxide gels. *Mater. Res. Bull.* **1981**, *16*, 669−676.
2. Yao, T.; Oka, Y.; Yamamoto, N. Layered structures of vanadium pentoxide gels. *Mater. Res. Bull.* **1992**, 27, 669−675.