48ª Reunião Anual da Sociedade Brasileira de Química

Emergências Climáticas?
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ANAIS

08 a 11 de junho de 2025, Campinas, Expo Dom Pedro

Anais da 48ª Reunião Anual da SBQ

48ª Reunião Anual da Sociedade Brasileira de Química

Campinas-SP
2025

Revisão textual e gramatical: Resposanbilidade dos respectivos autores.

Dados Internacionais de Catalogação na Publicação (CIP)
(Câmara Brasileira do Livro, SP, Brasil)

Reunião Anual da SBQ (48. : 2025 : Campinas, SP)
Anais da 48ª Reunião Anual da SBQ [livro eletrônico] / Sociedade Brasileira de Química. -- 1. ed. -- Campinas, SP : Aptor Software, 2025.
PDF

Vários autores.
Vários colaboradores.
Bibliografia.
ISBN 978-85-63273-70-3

1. Química I. Sociedade Brasileira de Química. II. Título.

25-282696 CDD-540

Índices para catálogo sistemático:

1. Química 540

Eliete Marques da Silva - Bibliotecária - CRB-8/9380

Área: MAT

Synthesis and solid-state NMR characterization of hybrid glasses based on Metal-Organic Framework materials.

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Keywords: *Solid-State NMR, Metal-organic frameworks, Zeolitic Imidazole Frameworks, Hybrid Glasses.*

Highlights

Structural characterization of Cd-based MOFs and their derived hybrid glasses by solid-state NMR techniques.

Abstract

Mixed-metal (Cd and Zn) mixed-ligand (imidazole and benzimidazole) MOFs were synthesized by the sol-gel method, adapting the experimental procedure described by Speight et al[1]. The thermal behavior of the synthesized materials was characterized by Differential Scanning Calorimetry (DSC) and structural insight into the coordination environment of organic ligands and metal centers was sought using ^{13}C and ^{113}Cd solid-state NMR techniques.

Figure 1. $^{13}C\{^{1}H\}$CPMAS for mechanochemical and sol-gel synthesis.

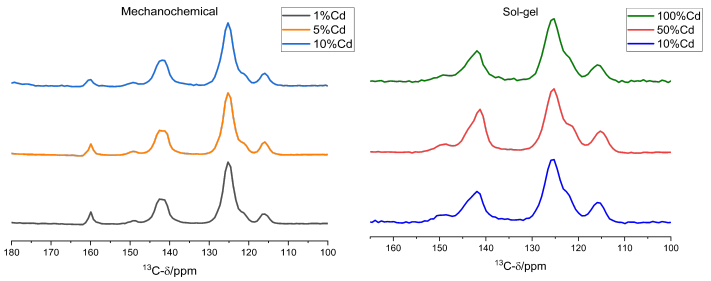
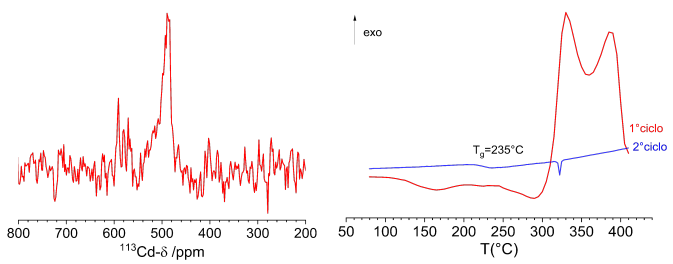


Figure 2. ^{113}Cd spectra and DSC for 100%Cd sol-gel synthesis.



The material obtained by sol-gel synthesis with 100% Cd showed the ability to form glass, as its counterpart, the ZIF-62.[2] ^{113}Cd NMR spectroscopy confirmed that cadmium is tetrahedrally coordinated with organic imidazole ligands. Additionally, DSC analysis revealed a glass transition temperature (T_g) at 235°C. To the best of our knowledge, this is the first time that a glass-forming ability is revealed for this particular composition.

References

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Acknowledgments

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