Review of: "Yerba Mate as a Co-Precursor in the Synthesis of Silica Through the Sol-Gel Technique"

Aiman Shahbaz[1]

1 University of Iowa

Potential competing interests: No potential competing interests to declare.

This article on using yerba mate as a co-precursor in the sol-gel synthesis of silica presents an innovative approach to leveraging agricultural waste for material synthesis. The focus on sustainability and the circular economy is timely. However, there are several areas where the manuscript could be improved. Firstly, while the introduction effectively highlights the importance of reducing waste, it lacks a comparative analysis of yerba mate relative to other biomass sources in terms of its advantages for silica synthesis. This comparison could provide a clearer justification for the choice of yerba mate. The experimental section, though generally clear, would benefit from more detailed explanations regarding the selection of reagent quantities and conditions. For instance, the rationale behind using specific volumes of yerba mate extract and ethanol is not sufficiently addressed, leaving questions about the optimization of these parameters. Additionally, the study would gain from a discussion on the reproducibility of the synthesis process, including variability in results across multiple trials. The characterization results, particularly those obtained from FTIR spectroscopy, are insightful but could be further detailed. The manuscript would be strengthened by a more thorough interpretation of the FTIR spectra, including direct comparisons with established literature to contextualize the findings. The figures included are helpful but lack clarity; for instance, the FTIR spectrum and gel image would benefit from clearer labels and annotations to highlight significant features and differences. Moreover, the conclusion touches on the potential applications of the synthesized silica but does so in a rather broad manner. A more detailed discussion on specific applications and the implications for industrial use would make the conclusions more impactful. Additionally, the manuscript could address potential challenges or limitations faced during the study and suggest practical solutions or future research directions. Finally, expanding the reference list to include more recent studies and comparative research on similar biomass-based synthesis approaches would provide a richer context for the research and highlight its novelty. Overall, while the article makes a notable contribution to sustainable material synthesis, addressing these points would significantly enhance its clarity, depth, and overall impact.