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 paper offers a novel method of utilizing agricultural waste for material synthesis by employing yerba mate as a co-precursor in the sol-gel synthesis of silica. It is appropriate to emphasize sustainability and the circular economy, but there are a few places in which the manuscript might be strengthened. First, although the introduction does a good job of emphasizing the need to minimize waste, it does not compare the benefits of yerba mate for silica synthesis to those of other biomass sources. This analogy might offer a more convincing defense of the yerba mate selection. Although largely understandable, the experimental section would benefit from more thorough explanations of the conditions and reagent quantity selection. For example, the reasoning behind the use of particular amounts of ethanol and yerba mate extract is not fully explained, raising concerns regarding the optimization of these parameters. The study would also benefit from a discussion of the synthesis process's reproducibility, including variations in outcomes across several trials. The characterization results, especially the FTIR spectroscopy ones, are interesting but could use more specificity. A more comprehensive analysis of the FTIR spectra, including direct comparisons with reputable literature to contextualize the results, would strengthen the manuscript. The provided figures are useful, but they are not very clear. For example, the FTIR spectrum and gel image could use better labels and annotations to draw attention to important details and variations. Furthermore, the conclusion mentions—albeit in a rather general way—the possible uses for the synthesized silica. The conclusions would have greater impact if there had been a more thorough examination of particular applications and the implications for industrial use. The manuscript may also discuss any difficulties or constraints encountered during the investigation and offer workable answers or ideas for further research. Lastly, adding more recent studies and comparative studies on comparable biomass-based synthesis methods to the reference list would give the research a deeper context and emphasize its originality. Although the article contributes significantly to sustainable material synthesis overall, it would be much clearer, deeper, and more impactful if these points were addressed.