Synthesis and characterization of silica biogenic nanoparticles obtained from rice husk.

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The nanomaterials synthesis based on reuse, such as those made from agricultural waste, is an exciting alternative for reducing the environmental impact. Another essential factor for obtaining nanoparticles (NPs) is green synthesis, which is more advantageous than chemical methods because it is non-toxic, environmentally safe, and lower cost[1]. Silica can be obtained from some agricultural residues and has important properties, such as insecticidal activity. As an inert material, it can increase plant resistance against pathological fungi. In the present work, we synthesize silica NPs using rice husk and a precursor, *Fusarium oxysporum* fungus. For comparative purposes, the same analyses were/will be applied to commercial silica NPs. The NPs have been synthesized, and physical-chemical characterization has been initiated by dynamic light scattering (DLS) and zeta potential (ZP), scanning electron microscopy (SEM), Energy-dispersive X-ray (EDX). The results showed the size of 345 nm, polydispersity (0.403), ZP (-28.5 mV) for biogenic silica. SEM demonstrated sizes (78-130 nm) and morphology close to spherical. For commercial NPs, the size was around 27 nm, polydispersity (0.329), and ZP (-37 mV). By SEM, the particles showed sizes (50-150 nm) and morphological characteristics like those obtained for biogenic NPs. The EDX showed peaks of similar elements in both NPs, with different intensities. The next step will be the functionalization of the NPs to optimize their stability and dispersion in matrices for future agricultural applications, verifying if the characteristics will be preserved. These results will be later exposed. The synthesis of safe, low cost and high biocompatibility materials as silica NPs, allows new studies for the development of products using these NPs, either for the benefit of silica or to use it as a nanocarrier.

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References:

[1] Jeelani, P. G, et al., *Silicon* 12, 1337 (2020)