

Title : Enhancing the Properties of a Morning Facial Defense Mask with lignin Nanoparticles from Corncobs

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ABSTRACT

This study aimed to investigate the properties of lignin nanoparticles for potential application in skincare products. Lignin was extracted from corncobs using an alkaline solution under autoclave conditions, yielding 9.85%. The extracted lignin was subsequently converted into nanoparticles through ultrasonication. The particle size and stability of lignin nanoparticles were analyzed using Dynamic Light Scattering (DLS) analysis. The results demonstrated the average particles of 173.58 nm with a Zeta potential and polydispersity index (PDI) values of -6.90 mV and 0.260, respectively. The antioxidant activity of the lignin nanoparticles was evaluated using DPPH and FRAP assays. The DPPH assay revealed an IC_{50} value of 11.27 $\mu\text{g}/\text{mL}$, while the FRAP assay demonstrated a FRAP value of 1203.97 ± 24.10 mg $\text{FeSO}_4 \cdot \text{H}_2\text{O}$ per gram of lignin nanoparticles. The lignin nanoparticles were investigated for their UV absorbability corresponding to UV-B and UV-A. The results showed that a 150 $\mu\text{g}/\text{ml}$ concentration significantly absorbs UV to levels acceptable for sunscreen applications. The tyrosinase inhibitory activity, a critical mechanism for reducing melanin synthesis, was also determined. Lignin nanoparticles demonstrated a slight inhibition of tyrosinase activity. Based on these findings, lignin nanoparticles could be incorporated as a key ingredient to enhance the morning facial defense mask such as sunscreen functionality and anti-aging benefits. These results indicated the significant potential of lignin nanoparticles as a multifunctional ingredient for advanced skincare solutions.

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