

Article

Synthesis, Characterization, and Antifungal Activity of Silver Nanoparticles Embedded in Pullulan Matrices

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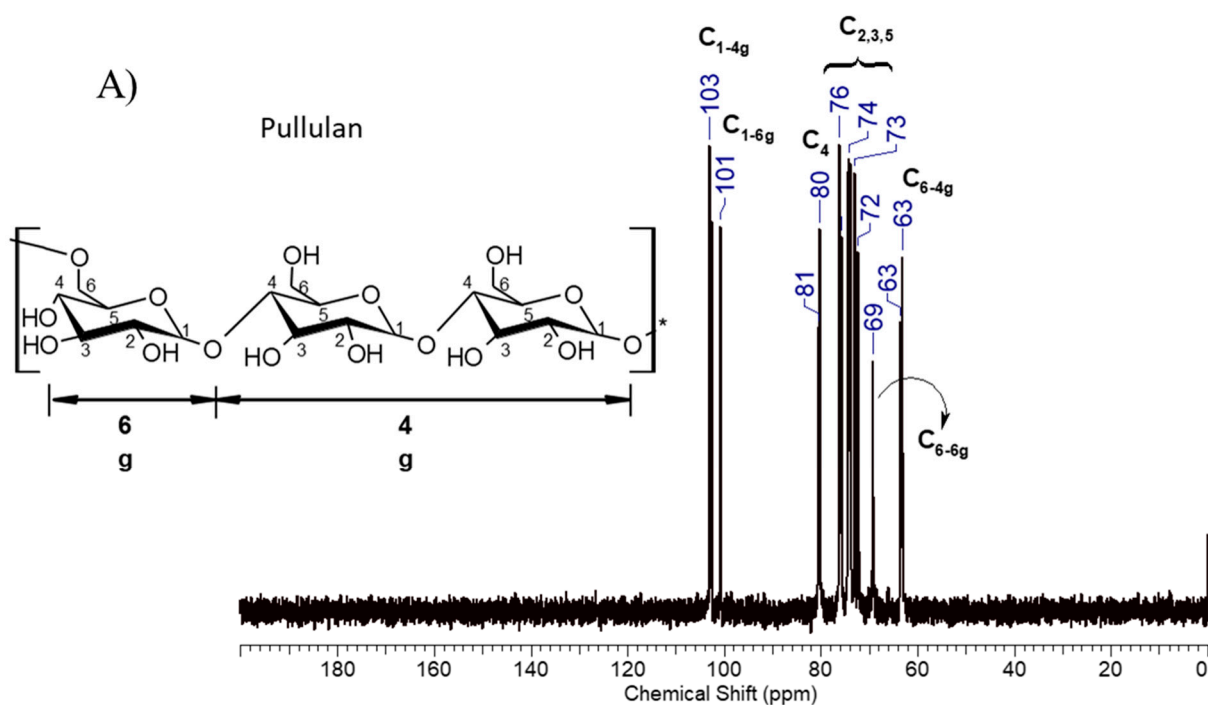


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Nuclear magnetic resonance spectroscopy

Nuclear Magnetic Resonance (NMR) Spectroscopy spectra were realized with a Bruker-Avance DR X 400 MHz Spectrometer, equipped with a 5 mm QNP direct detection probe and z-gradients. Solutions in D₂O of pullulan and oxidized pullulan using tetramethylsilane TMS ($\delta = 0$ ppm) as internal standard were used to record the ¹³C-NMR spectra.

The oxidation is clearly seen by ¹³C-NMR. The presence of the C signal at 175 ppm, characteristic for the -COOH groups, reveal that the oxidation process at primary -OH groups was occurred.



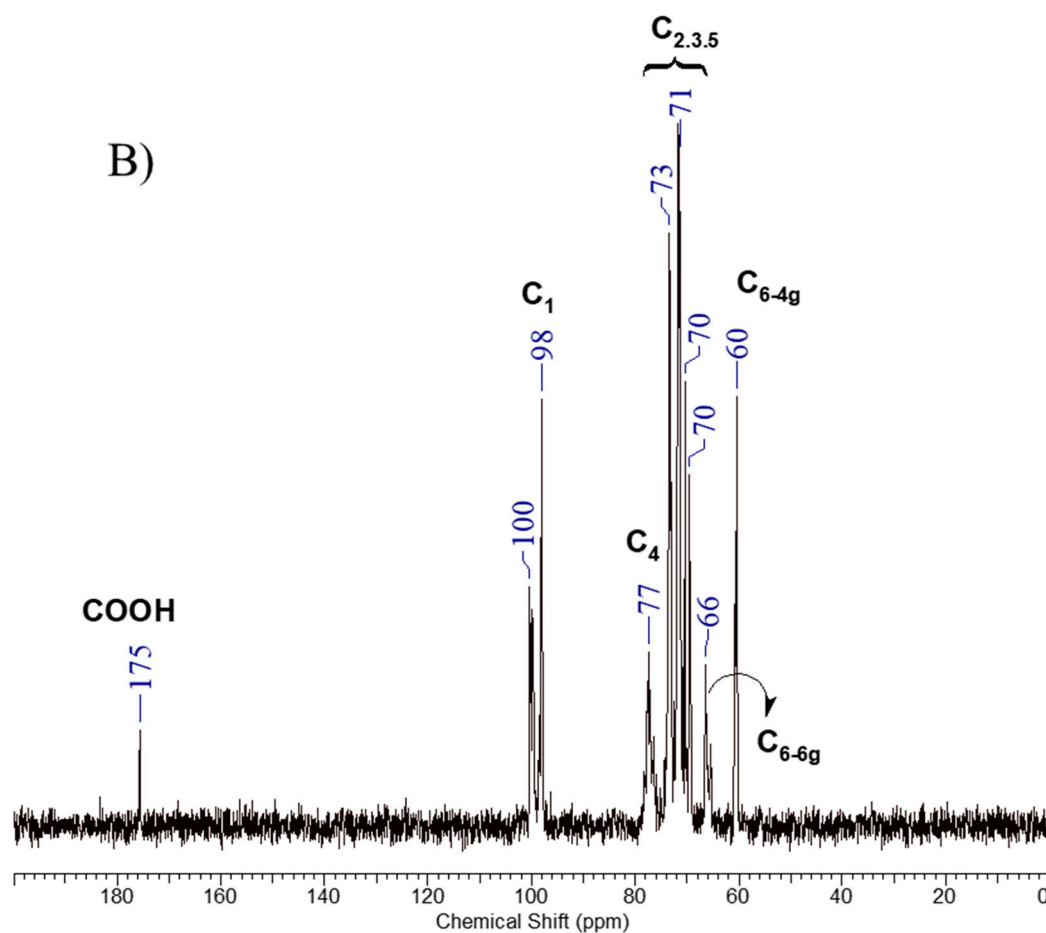


Figure S1. ^{13}C -NMR spectra of the pullulan before oxidation (A) and the pullulan obtained after oxidation in the presence of the TEMPO/NaClO/NaBr (B).

UV-visible spectrophotometer measurements

The AgNPs prepared by using pullulan or oxidized pullulan were characterized by using ultraviolet-visible (UV-vis) spectroscopy. The optical absorption properties of AgNPs samples were measured using a SPECORD 200 Analytik Jena spectrometer over the range of 300 – 700 nm. The effect of the reducing/stabilizing agent on the AgNPs formation is illustrated by recording the UV-Vis spectra, **Figure S2**. It is well known that silver nanoparticles absorb radiation in the visible region of the electromagnetic spectrum (380–450 nm) due to the SPR transition.

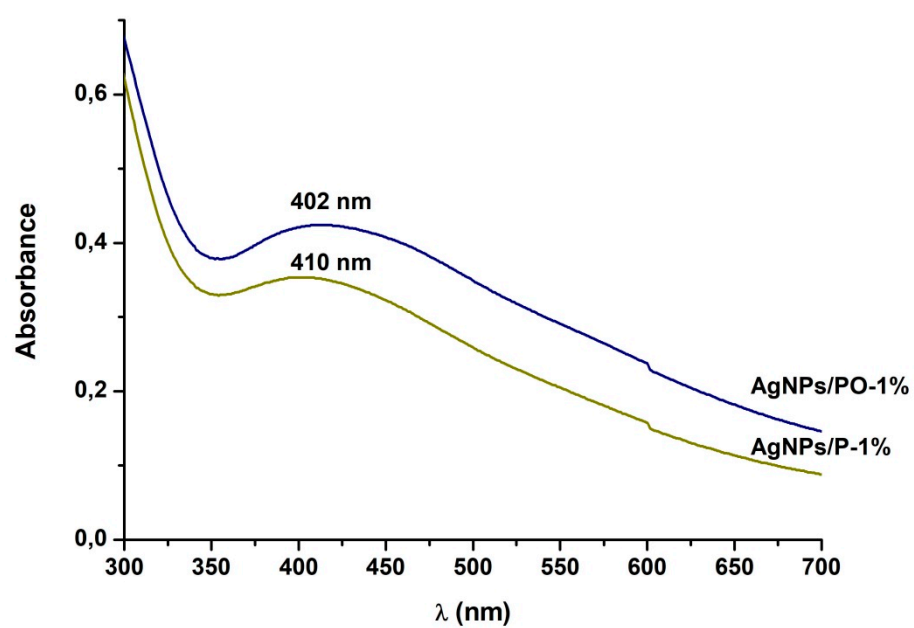


Figure S2. The UV-Vis spectra of the silver nanoparticles (pullulan: AgNPs/P-1% and oxidized pullulan: AgNPs/PO-1%) during synthesis, at room temperature.