



# Preparation and characterization of carbopol/silver nanoparticles composites obtained by heating process for antimicrobial application

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Titre	Preparation and characterization of carbopol/silver nanoparticles composites obtained by heating process for antimicrobial application
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Auteur	Haddadine, Nabila [1], Chalal, Samia [2], Bouslah, Naima [3], Souilah, Sihem [4], Benaboura, Ahmed [5], Barille, Régis [6]
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Mots-clés	Antimicrobial activity [7], ATR-FTIR spectroscopy [8], Carbopol [9], Heating process [10], Silver nanoparticles [11], TGA analysis [12]
Résumé en anglais	<p>Properties such as absorption, structural and external aspect of Carbopol/silver nanoparticles composites, prepared in DMF by heating process up to 30, 60, 80, 100 and 120 °C, were investigated by UV-visible, FTIR and SEM-EDS analyses. Samples were named respectively D30 to D120, according to the temperature at which they were extracted. The results showed that instead of the appearance of silver aggregates observed by SEM microscopy, all the obtained materials present a single absorption band centred at 430 nm, attributed to the classical surface plasmon excitation of the silver nanoparticles. The presence of silver nanoparticles is also proved by the X-ray powder diffraction XRD patterns, which show the appearance of small peaks corresponding to the face centered cubic (f.c.c.) silver phase in the case of D100 and D120 samples. Additionally strong interactions between silver ions and carboxylic groups of Carbopol were identified by ATR-FTIR spectroscopy. The thermal properties of the carbopol are effectively enhanced by the presence of silver nanoparticles as evidenced by thermo-gravimetric analysis. Furthermore the water loss that generally occurs at 100 °C in acrylic acid polymer was completely avoided in these new materials since less than 2 % of weight loss is recorded up to 160 °C. Finally, the inhibiting activity of Carbopol/silver nanoparticles composites against staphylococcus Aureus micro-organisms was confirmed for all the obtained materials, suggesting their suitable uses as effective growth inhibitors of micro-organisms and making them appropriate for diverse antimicrobial control systems.</p>

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### Liens

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