



“Green” Synthesis of Gold and Silver Nanoparticles with Propolis Extract and Rosa damascena Waste

Anton M. SLAVOV^{1*}, Daniela KARASHANOVA², Biliana GEORGIEVA², Ivelina VASILEVA¹, Vassya BANKOVA³, Rada DINKOVA⁴, Nikoleta YANTCHEVA¹

¹ Department of Organic Chemistry and Inorganic Chemistry, Technological Faculty, University of Food Technologies, Plovdiv, Bulgaria

² Institute of Optical Materials and Technologies, Bulgarian Academy of Sciences, Sofia, Bulgaria

³ Institute of Organic Chemistry with Centre of Phytochemistry, Bulgarian Academy of Sciences, Plovdiv, Bulgaria

⁴ Department of Canning Technologies, University of Food Technologies, Plovdiv, Bulgaria

*antons@uni-plovdiv.net

Received/Geliş Tarihi: 08/10/2018, Accepted/ Kabul Tarihi: 19/10/2018

*Corresponding author /Yazışılan yazar

Abstract

Propolis has been used in the traditional medicine for more than 2000 years. It is a treasured medicine due to its antifungal, antiviral, antitumor, immunomodulatory and anti-inflammatory properties. Additionally, due to its antibacterial and antioxidant activity, propolis is a potential candidate for “green” synthesis of nanoparticles (NPs) or/and composite materials with potential medical applications¹. Hence, the aim of the present study was focused on biogenic synthesis of gold and silver nanoparticles with propolis extract. A commercial Bulgarian poplar propolis extract was used. The composition of the extract was investigated by GC-MS. The synthesis was followed by visual observations and UV-Vis studies. The morphology and characteristics of the NPs were determined by transmission electron microscopy (TEM). Both, gold and silver nanoparticles were successfully obtained *in situ* in a simple, one stage process, with the propolis extract. Compared to plant extract from *Rosa damascena* waste (able to reduce the Ag⁺ and Au³⁺ in 2-3 minutes), the visual process of synthesis took 120 and 3 minutes, for silver and gold nanoparticles, respectively. The TEM studies confirmed the AgNPs and AuNPs synthesis with Bulgarian propolis extract. The GC-MS analysis revealed that the propolis was rich in flavonoids (pinobaksin, pinocembrin, chrysin, quercetin, kaempferol and their derivatives). The present study clearly demonstrated the potential of propolis extract for “green” synthesis of gold and silver NPs.

Acknowledgements: *We acknowledge the financial support from the National Science Fund of Bulgaria; project DN 17/22 “Valorization and application of essential oil industry wastes for “green” synthesis of metal nanoparticles”.*

References:

1. Matei PM, Martín-Ramos P, Sánchez-Báscones M, Hernández-Navarro S, Correa-Guimaraes A, Navas-Gracia LM, Rufino CA, Ramos-Sánchez MC, Martín-Gil J (2015) Synthesis of chitosan oligomers/propolis/silver nanoparticles composite systems and study of their activity against *Diplodia seriata*. International Journal of Polymer Science Article ID 864729, 11 pages, <http://dx.doi.org/10.1155/2015/864729>.