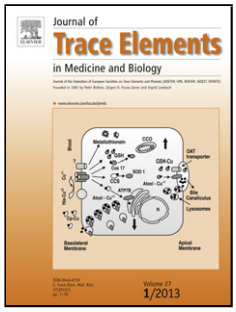
Accepted Manuscript



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PII: S0946-672X(17)30947-1
DOI: https://doi.org/10.1016/j.jtemb.2018.01.017
Reference: JTEMB 26046

To appear in:

Received date: 17-11-2017
Revised date: 13-1-2018
Accepted date: 31-1-2018

Please cite this article as: Faucher Stéphane, Soulé Samantha, Bulteau Anne-Laure, Allouche Joachim, Lespes Gaëtane.Gold and silver quantification from gold-silver nanoshells in HaCaT cells.*Journal of Trace Elements in Medicine and Biology* https://doi.org/10.1016/j.jtemb.2018.01.017

Gold and silver quantification from gold-silver nanoshells in HaCaT cells

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ABSTRACT

A method to determine total gold (Au) and/or silver (Ag) elemental concentrations from gold nanoparticles, Au-Ag nanoshells (NS) and silica coated Au-Ag nanoshells was developed, evaluated and validated. Samples were mineralized in a mixture of concentrated aqua regia and hydrofluoric acid at 65°C for 4 hours. Mineralized solutions were diluted and standard solutions were prepared in aqua regia 5%. ICP-MS analysis was performed with or without the use of a reaction cell (CRC). For the determination of elemental concentrations of nanopowders and test suspensions, the average recovery was 99±2% and 101±2% for gold and silver respectively. The repeatability was evaluated by the Relative Standard Deviation (RSD). The overall analytical RSD was ≤4% (n=3) and the RSD associated to ICP-MS analysis was ≤2% (n=10). The limits of detection were 0.005 and 0.002 µg(element) L^{-1} (analyzed solution), and the limits of quantitation 0.017 and 0.005 µg(element) L^{-1} (analyzed solution), for ^{197}Au and ^{109}Ag respectively. The Ag/Au mass ratios of the NS in the different samples considered are all equal to (0.93±0.04). From this information, the average thickness of gold and silver layers in the nanoshells was deduced, being 7.5±0.5 and 23±3 nm respectively. Finally, **t**he developed method was successfully applied to *in vitro* studies to evaluate NS cellular uptake in HaCaT keratinocyte cells confirming the method robustness toward biological medium. Experiments in cell culture medium gave coherent concentrations, 70 to 100% of uncoated or silica-coated NS being recovered, distributed between the culture