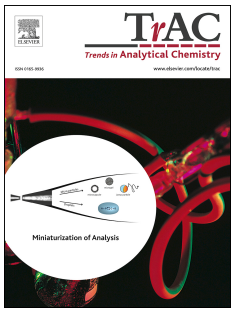
Accepted Manuscript



Copper nanostructures for chemical analysis using surface-enhanced Raman spectroscopy

Alexey V. Markin, Natalia E. Markina, Jürgen Popp, Dana Cialla-May

PII: S0165-9936(18)30329-7

DOI: 10.1016/j.trac.2018.09.004

Reference: TRAC 15240

To appear in: *Trends in Analytical Chemistry*

Received Date: 4 July 2018

Revised Date: 8 September 2018

Accepted Date: 8 September 2018

Please cite this article as: A.V. Markin, N.E. Markina, J. Popp, D. Cialla-May, Copper nanostructures for chemical analysis using surface-enhanced Raman spectroscopy, *Trends in Analytical Chemistry* (2018), doi: https://doi.org/10.1016/j.trac.2018.09.004.

Copper nanostructures for chemical analysis using surface-enhanced Raman spectroscopy

Alexey V. Markin[1], Natalia E. Markina[1], Jürgen Popp[2,3], Dana Cialla-May[2,3]

[1]Saratov State University, Astrakhanskaya 83, Saratov 410012, Russia

[2]Leibniz Institute of Photonic Technology e.V. Jena, Albert-Einstein-Str. 9, Jena 07745, Germany

[3]Institute of Physical Chemistry and Abbe Center of Photonics, Friedrich-Schiller University Jena, Helmholtzweg 4, 07743 Jena, Germany

Abstract

Surface-enhanced Raman spectroscopy (SERS) is a modern tool for chemical analysis. SERS utilizes plasmonic metal nanostructures (SERS substrates) to enhance the molecular specific Raman signal by several orders of magnitude (10^4–10^8). SERS substrates based on noble metals (gold and silver) are currently the gold standard due to their unique properties and high chemical stability. However, the application of noble metals significantly restricts widespread implementation of SERS in practice because of their high costs. To overcome this limitation, researchers are developing noble metal-free SERS substrates, and copper-based substrates are a highly promising alternative. The aim of this review is to summarize and critically discuss the available information regarding copper-based SERS substrates (fabrication, Raman enhancement properties, and fields of application) and to estimate their applicability for chemical analysis.

Keywords: copper nanoparticles; copper electrodes; CuNPs; SERS substrates; SERS; enhancement factor

Graphical abstract