Extending the applicability of pulsed glow discharge mass spectrometry to GHK-Cu determination.

International Journal of Mass Spectrometry  
Volume 449, March 2020, 116274

Xiaqing Xu, Yan Pan, Fred King  
C. Eugene Bennett Department of Chemistry, West Virginia University, Morgantown, WV, 26506-6045, United States

Abstract

The well-known elemental quantification method of glow discharge mass spectrometry (GDMS) is explored here for its potential in biomolecule quantification, specifically for the case of glycyl-L-histidyl-L-lysine copper (GHK-Cu) complex. A pulsed glow discharge (GD) coupled with time-of-flight mass spectrometer (TOF MS) is employed to examine analyte behaviors in different segments of a pulse. The 63Cu+ ion signal observed in the afterpeak regime of the discharge pulse provides a strong and stable signal suitable for quantification of the GHK-Cu complex. GD operating conditions were optimized based on the 63Cu+ ion signal. Using cesium iodide as an internal standard, the normalized 63Cu+ ion signal measured from a set of pure standard solutions exhibited a strong correlation to the GHK-Cu concentration. A linear response of 63Cu+ ion can be obtained from GHK-Cu in 5–40 μg/μL, with a limit of detection of 3.54 μg/μL. The good correlation of the elemental signal and the tripeptide concentration demonstrates the capability of GDMS in quantification of GHK-Cu and its potential for application in the quantification of other biomolecules.