



HAL
open science

Gold-promoted arylation of biomolecules: selenocysteine chemoselective modification by cyclometallated gold(III) compounds

Ioannis Kanavos, Douglas Hideki Nakahata, Raphael Enoque Ferraz de Paiva,
Luisa Ronga

► To cite this version:

Ioannis Kanavos, Douglas Hideki Nakahata, Raphael Enoque Ferraz de Paiva, Luisa Ronga. Gold-promoted arylation of biomolecules: selenocysteine chemoselective modification by cyclometallated gold(III) compounds. BioNEXT: AEBIN young Researchers Symposium, Mar 2024, San Sebastian, Spain. hal-04524762

HAL Id: hal-04524762

<https://univ-pau.hal.science/hal-04524762>

Submitted on 28 Mar 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Gold-promoted arylation of biomolecules: selenocysteine chemoselective modification by cyclometallated gold(III) compounds

I. Kanavos,¹ D. H. Nakahata,² R. Lobinski,¹ R. E. F. de Paiva² and L. Ronga¹

¹ Institut des Sciences Analytiques et de Physico-Chimie Pour l'Environnement et les Matériaux - IPREM, Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, i.kanavos@univ-pau.fr

² Donostia International Physics Center – DIPC, Paseo Manuel de Lardizabal 4, 20018 Donostia, Euskadi, Gipuzkoa, Spain

A low pKa (5.2), high polarizable volume (3.8 Å), and proneness to oxidation under ambient conditions make selenocysteine (Sec, U) a unique, natural reactive handle present in most organisms across all domains of life¹. Sec modification offers a unique and unexplored potential for site-selective modification and probing of proteins.

Our investigation is focused on the use of cyclometallated gold(III) compounds for the chemoselective arylation of selenobiomolecules². Here, the ability of several organometallic gold(III) compounds to promote the C-Se coupling in the active sites of Glutathion Peroxidase and Thioedoxin Reductase was studied by liquid chromatography coupled to electrospray tandem mass spectrometry. The conditions enabling the selective arylation of Se over S were found in selenoproteins, containing both Sec and Cys. Moreover, in competitive experiments, selenopeptides are preferentially arylated by gold(III) compounds, even in the presence of large excess of their Cys counterparts.

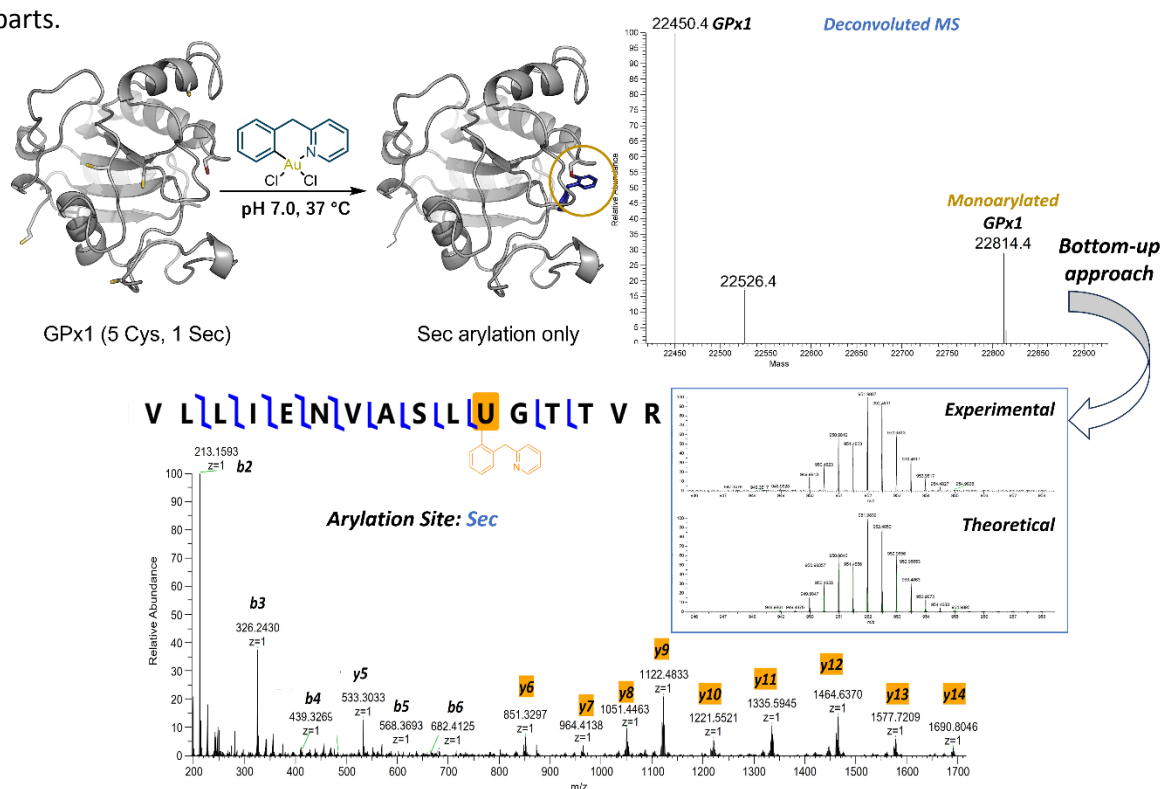


Figure 1. Selective arylation of Sec in GPx1 demonstrated by LC-ESI MS/MS

References:

- R. Mousa, R. N. Dardashti, N. Metanis, *Angew Chem Int Ed.* **2017**, *56*, 15818–15827, DOI: [10.1002/anie.201706876](https://doi.org/10.1002/anie.201706876).
- D. H. Nakahata, I. Kanavos, M. Zubiria-Ulacia, A. Inague, L. Salassa, R. Lobinski, S. Miyamoto, J. M. Matxain, L. Ronga, R. E. F. de Paiva, *Chem. - Eur. J.* **2023**, in press, DOI: [10.1002/chem.202304050](https://doi.org/10.1002/chem.202304050).

Acknowledgements: This research has received funding from the European Union's Horizon H2020 Research and Innovation under the Marie Skłodowska-Curie Grant Agreement N° 945416 through the PhD fellowship of IK. This project has also received funding from "la Caixa" Foundation (ID 100010434) through the Junior Leader fellowship to RdP (LCF/BQ/PI22/11910033).