



HAL
open science

Study of the protein corona formed by the adsorption of hemoproteins on silica nanoparticles

Laurent Marichal, J.-P Renault, Fabrice Cousin, S. Combet, A Gatin, J.-C Aude, Y Boulard, J Labarre, Serge Pin

► **To cite this version:**

Laurent Marichal, J.-P Renault, Fabrice Cousin, S. Combet, A Gatin, et al.. Study of the protein corona formed by the adsorption of hemoproteins on silica nanoparticles. 19th International Union for Pure and Applied Biophysics Congress, Jul 2017, Edinburgh, United Kingdom. cea-02339188

HAL Id: cea-02339188

<https://cea.hal.science/cea-02339188>

Submitted on 30 Oct 2019

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.

19th International Union for Pure
and Applied Biophysics Congress
11th European Biophysics Congress
July 16th–20th 2017, Edinburgh, UK
Mr Laurent Marichal
April 28, 2017

Abstract # 1341

Study of the protein corona formed by the adsorption of hemoproteins on silica nanoparticles

L. Marichal^{1,2}, J.-P. Renault¹, F. Cousin³, S. Combet³,
A. Gatin¹, J.-C. Aude², Y. Boulard², J. Labarre², S. Pin¹
¹LIONS, NIMBE, CEA, CNRS, Université Paris-Saclay,
CEA Saclay, France; ²I2BC, IBITEC-S, CEA, CNRS,
Université Paris-Sud, Université Paris-Saclay, France;
³Laboratoire Léon-Brillouin, CEA-Saclay, France

The performance of a bio-nanomaterial essentially results from interactions that occur at its surface and that depend on the adsorption of biomolecules, particularly proteins. In order to improve the biocompatibility of nanomaterials, one of the challenges is to understand the mechanisms of protein adsorption and to appreciate the modifications of adsorbed proteins.

Using model hemoproteins and monodisperse silica nanoparticles (SiNPs) we studied the impact of the protein size on its ability to interact on the silica surface in a qualitative and quantitative way. Adsorption differences between myoglobin and hemoglobin (Devineau *et al.*, Langmuir, 2017) were previously investigated and we decided to extend the comparison to even larger hemoproteins that can be regarded as oligomeric hemoglobins. We studied the hemoprotein/SiNPs interactions using a panel of methods: adsorption isotherms, circular dichroism, small angle neutron scattering, and isothermal titration calorimetry. The end result of this study is that the protein size can have a major impact in terms of global affinity towards a silica surface but also in terms of protein structure alteration and thermodynamic changes caused by the adsorption.