Proceedings International
Platinum Open Access Journal (ISSN 2668-6384)

Proceedings, Abstract
Volume 4, Issue 1, 2022, 29
https://doi.org/10.33263/Proceedings41.029

Protein-Polymer Nanocarriers: Design, Synthesis, and Applications †

Kelly Velonia [1,*]

[1] Department of Materials Science and Technology, University of Crete, Heraklion, Crete, Greece
* Correspondence: velonia@materials.uoc.gr (K.V.);
† Presented at 1st OncoHub Conference – Connecting Scientists for Next Generation Cancer Management (13-15 October 2021, virtual)

Received: 25.10.2021; Accepted: 5.02.2022; Published: 14.02.2022

Abstract: Proteins represent a unique class of biomaterials critical in all key physiological processes of life. Except for PEGylated proteins, protein-based biomaterials remain up to date largely understudied due to the instability and inherent immunogenicity of native proteins. A key approach toward protein-based biomaterials involves the synthesis of well-defined protein-polymer conjugates. To this end, a recently reported oxygen tolerant, photoinduced controlled radical polymerization approach which readily affords quantitative yields of well-defined protein-polymer conjugates will be discussed. Following this approach, diverse monomer classes including acrylates, methacrylates, styrenics, and acrylamides were utilized to produce a wide variety of bioconjugates within two hours, in the absence of any additives or external deoxygenation procedures using low-organic content media and ppm levels of copper. Importantly, it will be shown that this new methodology is compatible with multiple proteins and enzymes without damaging their secondary structure or catalytic profiles. To exemplify the robustness of the protocol, its implementation under different light sources and reaction media, and the ability to tune polymer grafting through varying reaction components, will be presented. Special focus will be given to novel families of responsive and amphiphilic protein-polymer conjugates, which were synthesized following this approach in quantitative yields, forming hybrid nanostructures with a broad range of potential applications.

Keywords: bioconjugates; protein polymer conjugates; biopolymers; nanoparticles; delivery.

Funding

This research received no external funding.

Acknowledgments

This research has no acknowledgment.

Conflicts of Interest

The authors declare no conflict of interest.