Cell surfaces remodelling by tyrosine-click electrochemistry

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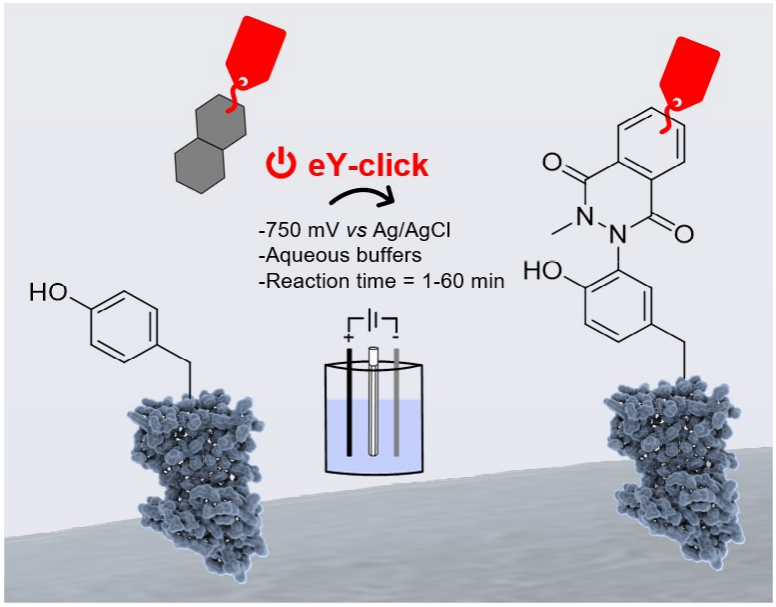
The chemo-selective modification of native proteins is of particular importance in chemical biology and for the development of therapeutic conjugates. Direct proteins modifications with chemical reagents are still mostly performed on nucleophilic lysine and cysteine, but much effort is now dedicated to selectively target less exploited amino acids.[1] Recently, we developed the first electrochemical method coined eY-click to functionalize tyrosine (Y) residues in biocompatible media.[2] Peptides, enzymes, and antibodies were labeled in aqueous buffers after dipping a three-electrode system, to selectively oxidize (activate) a functionalized diazodicarboxamide anchor *in situ*.[3]

Here, we used *N*-methylluminol, a fully selective Y anchoring group after one electron oxidation, for the electro-bioconjugation of cell surfaces from virus, bacteria and eukaryotic cells. The click-electrochemistry method was explored on therapeutic adeno-associated viruses (AAV2), *E. coli* (Gram-) and *S. epidermis* (Gram+) bacterial strains, and HEK293 and HeLa eukaryotic cell lines. Cell surfaces were decorated with azido-groups or carbohydrates in minutes. Surprisingly, living bacteria and cells fully conserved their ability to replicate, and a mannose decorated AAV2 its cell transduction efficiency, opening perspectives for studying complex cell surface process and to viral, bacterial and cell-based therapies.



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(2) Alvarez-Dorta, D.; Thobie-Gautier, C.; Croyal, M.; Bouzelha, M.; Mével, M.; Deniaud, D.; Boujtita, M.; Gouin, S. G. (2018) J. Am. Chem. Soc. 140 (49), 17120–17126.

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