On the structure-property relationships in sequence-defined macromolecules

David Dellemme, Julien Lernould, Mathieu Surin

Laboratory for Chemistry of Novel Materials, Center of Innovation in Materials and Polymers, University of Mons – UMONS, Belgium

Inspired by the exquisite properties of sequence-defined biopolymers such as DNA and proteins, researchers are increasingly developing synthetic macromolecules in which the information at the sequence level imparts specific functions.[1] Notable recent examples of applications of sequenced-defined macromolecules (SDMs) include (bio)recognition, catalysis, and data storage.[2-3] Our group has recently harnessed SDMs with various backbones and lateral units in view of exploring the relationship between 1D sequence, 3D structure, and properties, through a joint modeling and experimental approach.

In this talk, we report two examples: i) the supramolecular self-assembly of complementary SDMs bearing nucleobases and catalytic units, toward improved catalysts for the aerobic oxidation of alcohols;[4] ii) the binding of SDMs bearing several recognition units to fragment antigen-binding antibody (Fig. 1), toward improved avidity via multivalency in the context of immunotherapy.[5-6]

By establishing sequence-structure-property relationships of these SDMs, our results point toward a better understanding of interactions networks between functional units, toward a rational design of SDMs.[7]

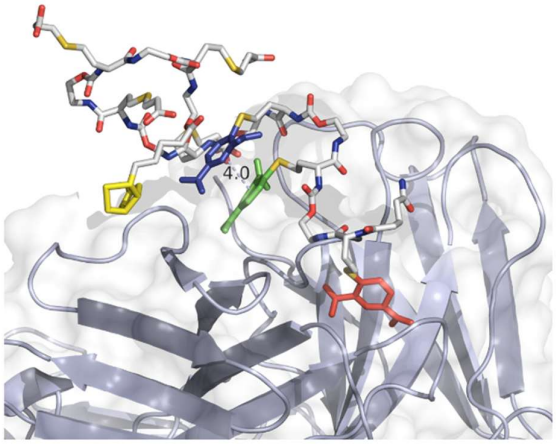

Figure 1: Example of interaction between a synthetic SDM (in stick) and a fragment antigen-binding antibody (in gray). One dinitrophenyl recognition unit (in red) is bound the to the antibody binding pocket, whereas two other units are stacked at the periphery of the protein.

References

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