Aline Debrassi

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Project	Biofunctionalization of porous aluminum oxide for targeted capture and growth of microbes
Fields of interest	Surface chemistry, organic chemistry, carbohydrate chemistry, microbiology
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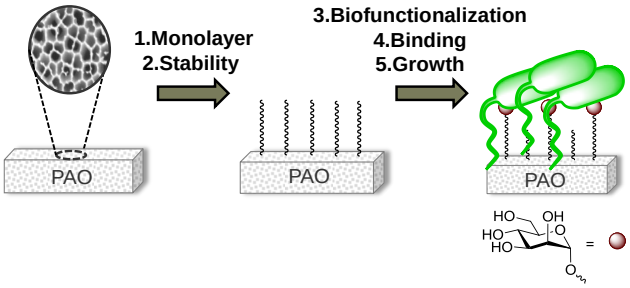
Introduction

Porous aluminum oxide (PAO) is a nanoporous material used for various biotechnological applications, including the culturing of microorganisms. The ability to chemically modify the PAO surface and attach biomolecules that interact with a target microorganism will allow for more advanced applications of PAO.

Goal

Our objective is to covalently biofunctionalize PAO to enable the selective capture of a specific microorganism from a complex mixture and subsequently culture it on the same surface.

Progress achieved



The crucial initial step in the biofunctionalization of PAO is the generation of a stable organic monolayer on the surface. To identify the most stable modification, PAO was modified with most functional groups known from literature and their stability was assessed. PAO modified with phosphonic acids proved the most stable at pHs and temperatures that are important for bacterial growth [1]. Next, we investigated the scope of terminal reactive groups suitable for (bio)functionalization of PAO. Starting with a straightforward initial modification of the PAO surface with bromo-terminated phosphonic acid, we successfully prepared PAO surfaces presenting various terminal functional groups, such as azide, alkyne, alkene, thiol, isothiocyanate, and *N*-hydroxysuccinimide (NHS) [2]. We already showed in a proof-of-principle that mannose-biofunctionalized PAO provides increased adherence of *Lactobacillus plantarum* [1]. We are currently investigating the attachment of other biomolecules on PAO (lectins and antibodies) and exploring its scope in targeted bacterial capture and growth.

References

[1] Debrassi, A. et al. Stability of (bio)functionalized porous aluminum oxide. *Langmuir*, 30 (2014), 1311-1320.
[2] Debrassi, A. et al. Versatile (bio)functionalization of bromo-terminated phosphonate-modified porous aluminum oxide. *Submitted*.

Acknowledgements

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