

NEW PHOSPHATES/PHOSPHONATES; A MODULAR APPROACH TO FUNCTIONAL SAMs

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INTRODUCTION: An alternative and complementary surface treatment to the PLL-PEG strategy is the use of functionalized self assembled monolayers (SAMs). Alkylthiols on gold and alkylphosphates and phosphonates on metaloxide surfaces have been shown to form stable well ordered monolayers. The functionalisation of these molecules, to use them as docking site is possible, but not straightforward. The application of simple alkane phosphate or phosphonate SAMs to produce biointerfaces has furthermore proven to have a number of limitations, in particular stability in aqueous media. Therefore it is proposed to use a modular approach for the synthesis of new functional self-assembling substances. In the same strategy, we include a reactive group, which can be used to crosslink, respectively polymerize the molecules once they have self-assembled on the surface. This is to increase the final stability of the films. A sketch of this strategy is depicted in Figure 1.

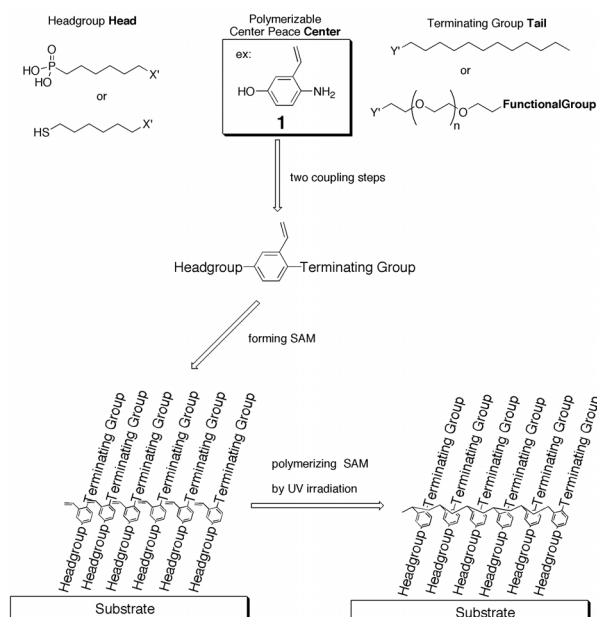


Fig. 1: Sketch of the modular synthesis of self-assembling functional molecules. Possible heads and tails are depicted.

METHODS: This approach is expected to eliminate the main disadvantages of the simple alkane phosphate SAMs, i.e. the inferior stability in aqueous solutions and the difficulty to introduce reactive docking sites for the attachment of biomolecules.

A candidate for the center molecule is 4-amino-3-vinyl-phenol **1**. The phenol group can be used to attach the headgroup while the aminogroup can be

coupled to a fraction of the end-functionalized terminating groups. The vinyl group will be the polymerizable group.

RESULTS: A new synthesis for **1** has been worked out and already proven to function (Figure 2). Using an amino group for the attaching site for the functional end groups, makes it theoretically possible to attach up to three equal or different chains in the same molecule. This could be advantageous to increase the density as well as the order of the SAM.

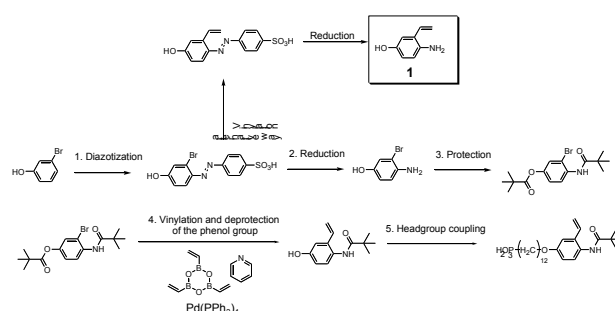


Fig. 2: New synthesis route.

DISCUSSION & CONCLUSIONS: This is an alternative and complementary surface treatment to PLL-PEG strategy. Introduction of specific docking sites have relevance for applications in areas such as: biomaterials, biosensors and adhesion. Alternative synthesis routes and polymerization will be carried out.

REFERENCES: R. Hofer, M. Textor, N.D. Spencer *Alkyl Phosphate Monolayers, Self-Assembled from aqueous Solution onto Metal Oxide Surfaces*, *Langmuir* **17** (13), 4014-4020, 2001.

ACKNOWLEDGEMENTS: This research is supported by the National Research Program "Supramolecular Functional Materials" (NRP 47).