Tailoring Surface Structure of Redox-Gradient Dendrimers for in-situ Surface Attachment and Charge Compensation

J. R. Duncan and S. C. Blackstock
The Department of Chemistry, The University of Alabama

Abstract

New redox-gradient dendrimer prototypes are synthesized with ester and acid groups on the periphery. Thermal annealing of the ester- or acid-terminated physisorbed films is expected to yield chemisorption of the organic layer to the surface OH groups via anhydride formation. The acid terminated groups are also expected to bind to basic surfaces and to provide charge compensation for improved charge storage.

4AA/PD Ester Redox-Gradient Dendrimer

4AA/PD Ester Synthesis

Previous Redox-Gradient Dendrimer Series

TAPD mono-Ester Synthesis

Cyclic Voltammetry of the TAPD mono-Ester

4AA/PD Ester Redox-Gradient Dendrimer

Acid versus Carboxylate Electrochemistry

Thermal Conversion to Corresponding Acids

Summary

• Ester functionality was successfully introduced synthetically into the periphery of the 4AA/PD array via palladium chemistry.

• The redox-gradient was assessed for the new dendrimer prototype as 0.34 V.

• Easy thermal conversion of the esters to the corresponding acids was successful.

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For more information and reprints contact:
Rick Duncan, Chemistry Department. E-mail: dunca022@bama.ua.edu

The University of Alabama