Role of Contact angle on The Morphology of Nanopolymers Produced by Solution Wetting of Templates

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ABSTRACT:

It has been shown recently that the surface interaction between solutions and templates can have a significant effect on the morphology of nanopolymers produced through the use of AAO templates. The purpose of this investigation was to characterize the interaction between AAO templates and various polymer-solvent systems through contact angle measurements. In general, the contact angle increases with molecular weight and concentration. The contact angle data are currently being correlated with the polymer morphology.

Introduction

- Template assisted fabrication produce nanomorphologies.
- Solution filled the template
- Etching
- Nanostructures produced

Dipping method: (1) Single Dipping Method; (2) Multiple Dipping Method.
- From Megan Pasquali’s paper, the contact angle measurements show a significant effect on the single dipping method.

Objectives

- To correlate the contact angle with the final polymer structure.
- To develop a model to understand tube-rod transition in various polymer systems.
- To study the interaction between polymer solution-AAO template through contact angle measurements

Methodology

Polymer-solvent system used in this study

Contact angle measurement

AAO template

Producing Nanostructures

- Single immersion for 30 min.
- Template dissolved with NaOH.
- Nanostructures collected by centrifugation and sonication.

Contact angle measurement of Rod and Tube with PS system

Conclusions

- For various polymer-solvent systems increases with Concentration and M_w.
- In general, rods at low θ, and tubes at high θ.
- Rod diameter is around 200-350 nm, Tube diameter is around 100 nm, and tube wall thickness is ~5 nm.
- General procedure for producing rods or tubes established for various polymer-solution systems.
- Diameter of rod which at low contact angle range from 200nm-300nm; Diameter of tube which at high contact angle range from 100nm-200nm, the wall thickness is around 50nm.

References