

Preparation and characterization of macromolecular “hedge” brushes grafted from Au nanowires

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Supporting information.

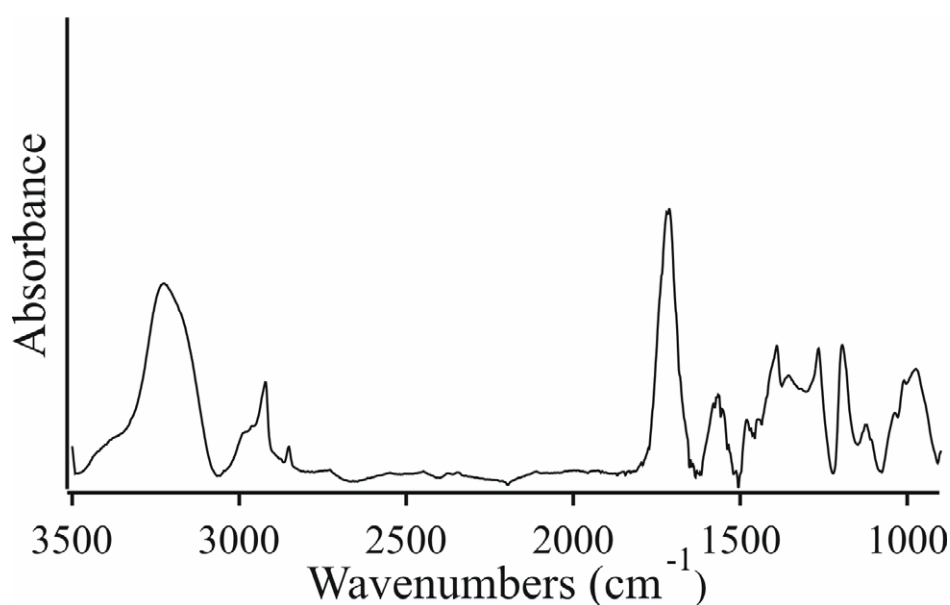


Figure 1.

In Figure 1 FTIR spectrum of surface grafted PMAA brushes is depicted. The double peak at 1720 and 1712 cm⁻¹ is related to the C=O stretching of the carboxylic acid moieties, at 1265 and 1195 cm⁻¹ two signals indicate the C-O stretching. The broad absorption band at 3300-3100 cm⁻¹ is caused by hydrogen bonding between the PMAA chains in the dry state.

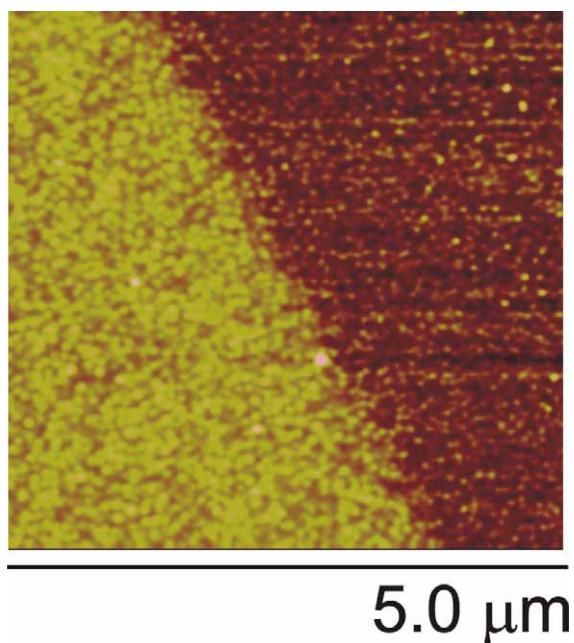


Figure 2.

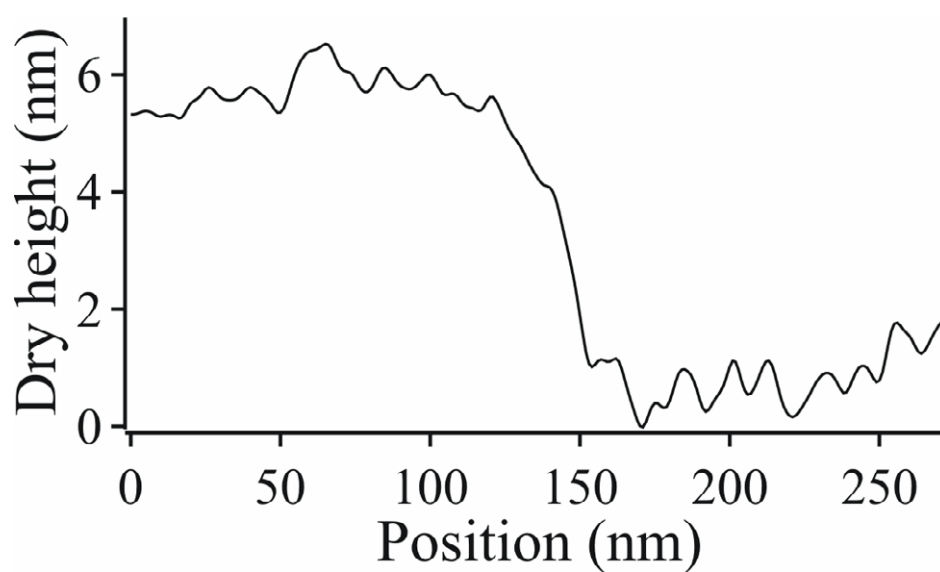


Figure 3.

In Figure 2 TM-AFM image illustrating a step in the brush obtained by mechanically removing the polymer layer on the right hand side. The corresponding height profile in Figure 3 shows the height difference between scratched (bare gold) and unscratched area. The image was obtained in air on a dry PMAA brush.

Estimation of the grafting density.

In order to evaluate the molecular weight and the grafting density of the grafted PMAA brushes, a 10x10 cm gold coated silicon wafer was incubated overnight in a 50:50 mol% solution of DTCA-ODT and subsequently irradiated with UV light in the same conditions reported for the synthesis of the “hedge” brushes on gold nanowires.

After polymerization and extensive rinsing with water, the slides were immersed overnight in a 0.5 M solution of NaOH to induce the cleaving of the grafted polymer chains via hydrolysis.

Matrix-assisted laser desorption/ionization time of flight spectroscopy (MALDI-TOF) was used to evaluate the molecular weight of the detached polymer obtained (for a matrix solution, 2,5 dihydroxy benzoic acid/acetonitrile/water was used).

Using this technique a M_n of $1200 \pm 400 \text{ g mol}^{-1}$ was calculated and thus an average grafting density of $0.4 \text{ chains nm}^{-2}$ was estimated.