Supporting Information

for

# Water-Harvesting Polymer Coatings for Plant Leaves

*Roland Milatz,[†] Carmen Reink,[†] Tom van den Berg[§], Joost Duvigneau*,[†] G. Julius Vancso*,[†] and Frederik R. Wurm*,[†]*

† Sustainable Polymer Chemistry, Department of Molecules and Materials, MESA+ Institute for Nanotechnology, Faculty of Science and Technology, University of Twente, Enschede, The Netherlands.

§Department of Integrated Devices and Systems, University of Twente, Enschede

7522 NB, the Netherlands.

Corresponding Authors

*E-mail: g.j.vancso@utwente.nl (G.J.V.).

*E-mail: j.duvigneau@utwente.nl (J.D.).

*E-mail: Frederik.wurm@utwente.nl (F.R.W.)

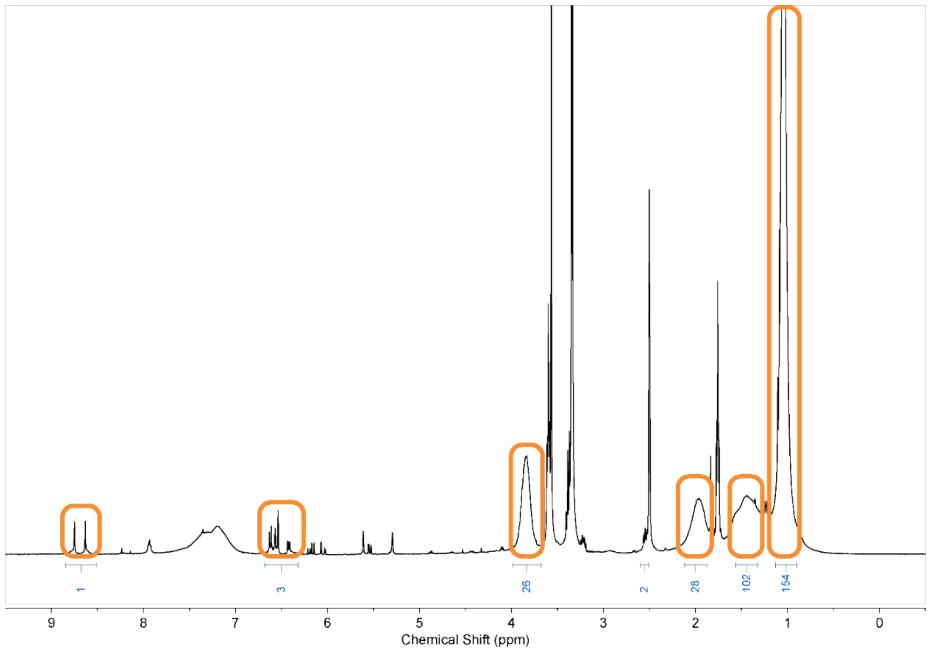


**Figure S1** $^{1}$H NMR spectrum (400 MHz in DMSO-$d_6$ at room temperature) of the PNIPAM-*b*-PDOMA blockcopolymer. The orange boxes indicate the peaks marked below. Note the small amount of double bonds from DOMA still present between 6 and 5 ppm. δ = 8.8-8.65 (-OH ,d, 2H), δ = 6.65-6.40 (aromatic, m, 3H), δ = 3.85 (CH, s, 1H), δ = 1.98 (-CH-, s, 1H), δ = 1.45 (-CH2-, s, 2H), δ = 1.05 (-CH3, s, 6H).

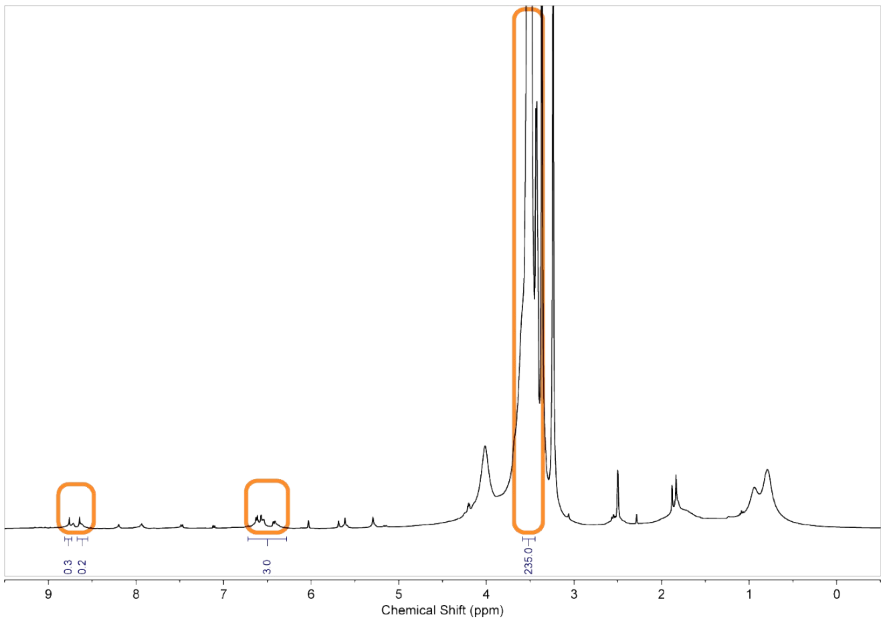


**Figure S2** $^{1}$H NMR spectrum (400 MHz in DMSO-$d_6$ at room temperature) of the PDOMA-*b*-POEGMA blockcopolymer. The orange boxes indicate the peaks marked below. Note the small amount of double bonds from DOMA still present between 6 and 5 ppm. δ = 8.8-8.65 (-OH ,d, 2H), δ = 6.65-6.40 (aromatic, m, 3H), δ = 3.5 (-$CH_2$-$CH_2$-O-, s, 1H).

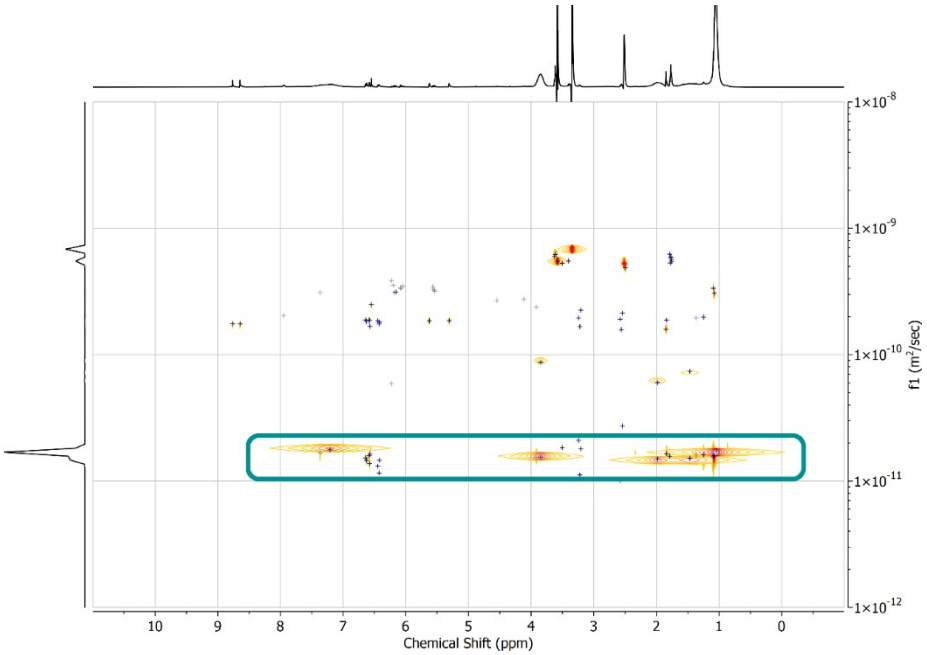


**Figure S3** $^{1}$H DOSY NMR (400 MHz, DMSO-$d_6$) of PNIPAM-*b*-PDOMA. (note residual DOMA monomer (C=C-resonances between 6 and 5 ppm detected at different coefficient value).

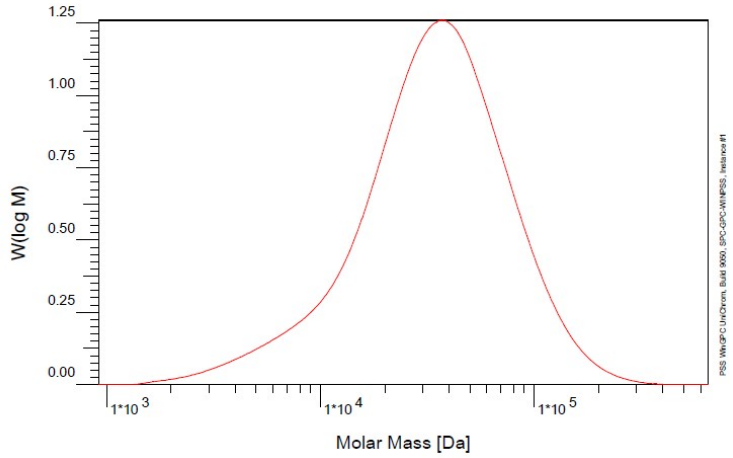


**Figure S4** Apparent molar mass distribution of PNIPAM measured by GPC in DMF vs PS standards, $M_n$= 22,200 g/mol, $Đ$=2.0.

**Table S1** Molecular data of synthesized polymers, where applicable. Mw and Mn adjusted from GPC data after addition of the DOMA block using composition according to $^{1}$H-NMR. Because the POEGMA block is added after the DOMA block, GPC data is not available for this polymer.

| Polymer | Mw (g/mol) | Mn (g/mol) | Polydispersity (*Đ*) | Mol% DOMA | Mol% NIPAM/POEGMA |
|---|---|---|---|---|---|
| PNIPAM-*b*-PDOMA | 47600 | 23800 | 2 | 4% | 96% |
| PDOMA-*b*-POEGMA | x | x | x | 13% | 87% |

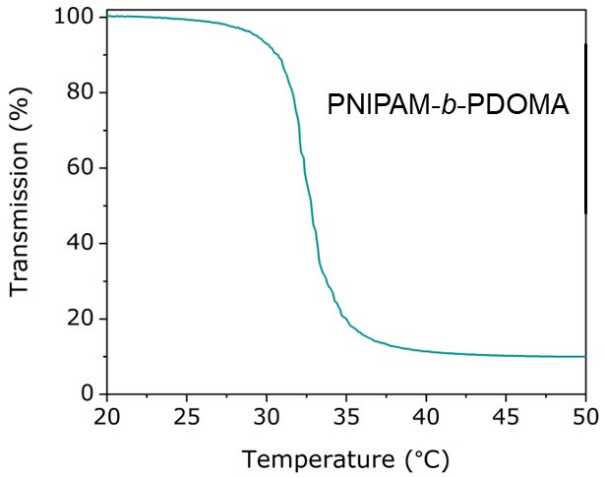


**Figure S5** Turbidity measurement of PNIPAM-*b*-PDOMA. (measured at 19 mg/mL in water)

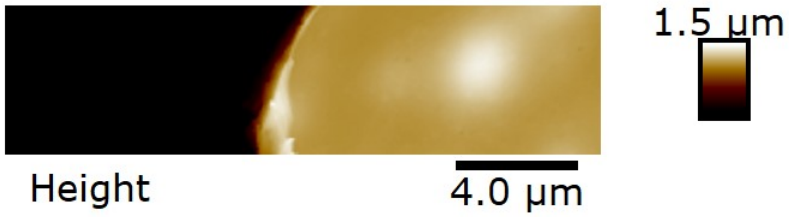

**Figure S6** AFM Tapping Mode height map used for determining the step height. The values are calculated after flattening and plane fitting the surface based on the bare, flat Si surface on the left. The Roughness Analysis tool is used to calculate the average height on the left and right of the "cliff" separately. The height of the layer is subtracted by the height of the Si layer to obtain, finally, a value for the step height. This is repeated at different spots all over the surfaces to obtain a representative average step height.

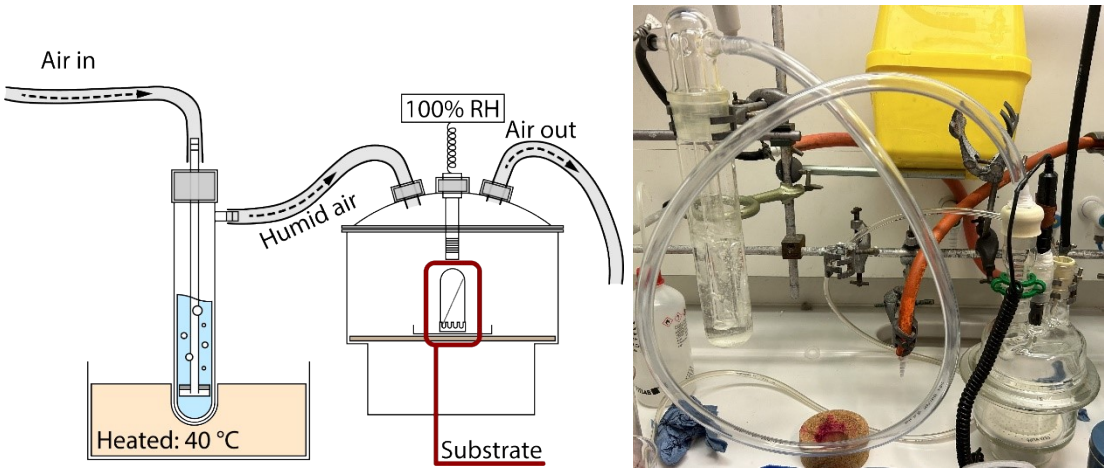


**Figure S7** *left*: Schematic representation of the set up for water harvesting measurements. Air is blown through the glass tube on the left, which is slightly heated to obtain water at 100% RH. This saturated air is blown into the dessicator which contains a sample set in a holder inside a petri dish. The substrate is weighed before and after each test as well as the water contents of the petri dish, if present. *right*: Set up for measurements of water harvesting on PE substrates with and without coating. Air is blown up into a glass cylinder filled with water, heated (not shown) at 40 °C. This air is subsequently blown through a tube to the desiccator containing a substrate. When it reaches the desiccator, the air will have cooled down to room temperature.

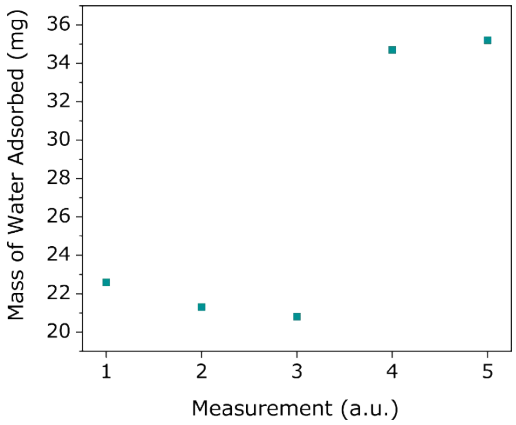


**Figure S8** Plot of Adsorbed Water Mass per measurement of five total.

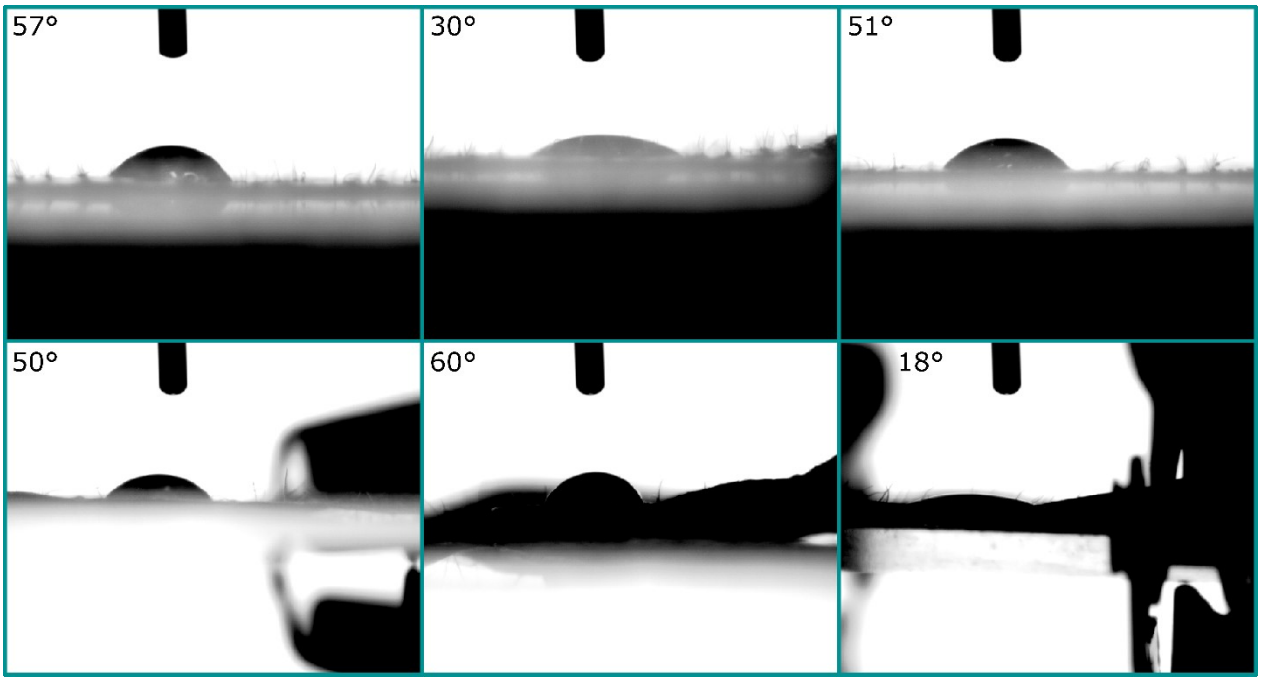


**Figure S9** Surface Contact Angle Images of PDOMA-*b*-POEGMA on corn leaves. Top row measured at room temperature (ca. 21°c, average angle: 43±18°), bottom row is at elevated temperature (50 °C, average angle: 46±12°).