Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supplementary information

Photoacid generator-polymer interaction on the quantum yield of chemically amplified resists for extreme ultraviolet lithography

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Figure S1.

Schematic of the experimental setup for the measurement of transmittance of thin photoresist film spin coated on a SiN_x membrane. The beam is generated by the undulator source and focused to a spatial filter pinhole of 30 μm diameter and expands about 12 meter resulting in a relatively homogenous beam over several millimeters with an average flux of about 30 mW/cm^2. A square open-frame mask (0.5 × 0.5 mm^2) is located in front of the sample to crop out the beam tail. The transmittance intensity of the light passing through a thin film, spin-coated on a silicon nitride membrane is measured as a function of time during the exposure. A photodiode is located behind the sample and its photocurrent is collected at a high rate (50 Hz) using a Keithley 6430 amperometer (see Supporting information S1).

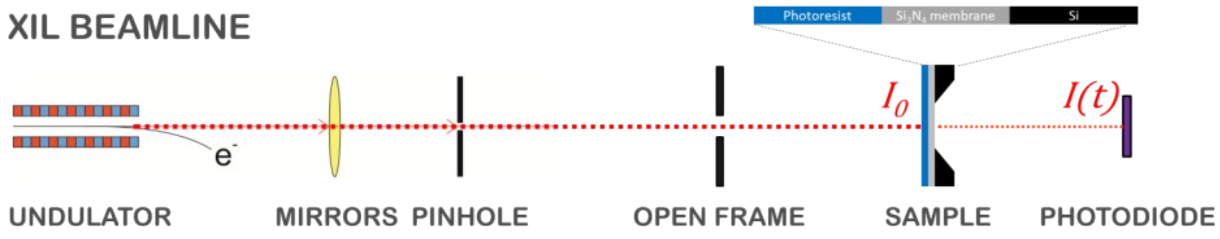


Figure S2.

Example of extraction of Dill parameters from a transmittance measurement, as a function of time, for thin photoresist films. The transmittance T_X is measured as the photocurrent (Y-axis, in ampere) flowing in a photodiode located behind the sample, while the sample itself is exposed to EUV light for time equal to the time-to-clear (X-axis, in s). The linear absorption coefficient α of the pristine sample is extracted from the T_X at the beginning of the exposure (t = 0). The unbleachable Dill parameter B is extracted from the T_X at the end of the exposure, i.e., when the sample is fully exposed (green dashed line). The bleachable Dill parameter A is given by the relative variation of transmittance from the beginning to the end of the exposure. The Dill parameter C is proportional to the slope of the variation of photocurrent at the beginning of the exposure (red dashed line).

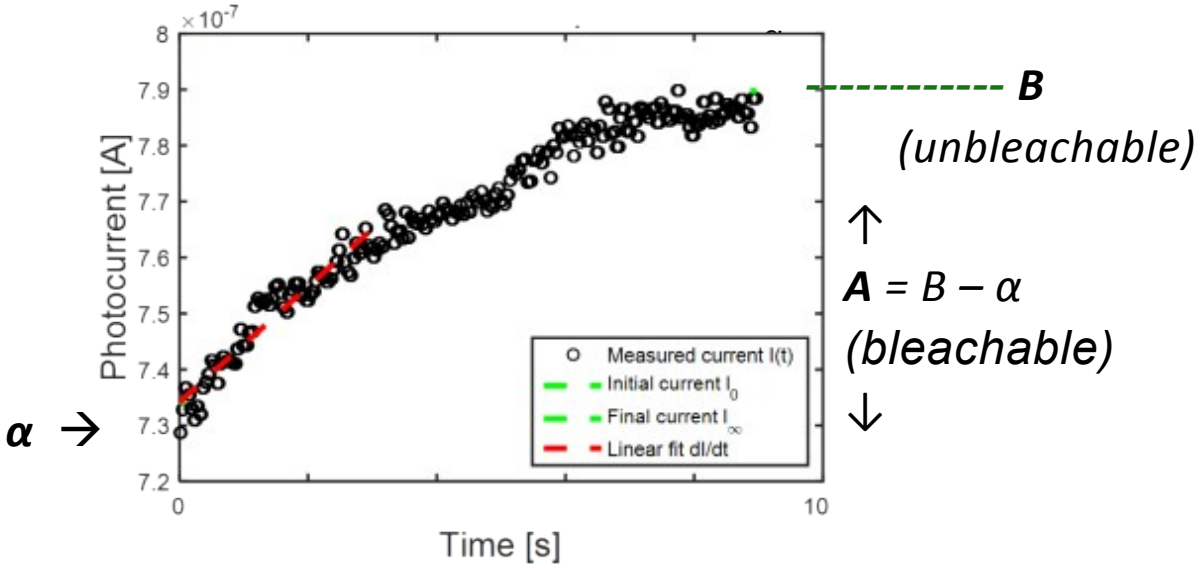
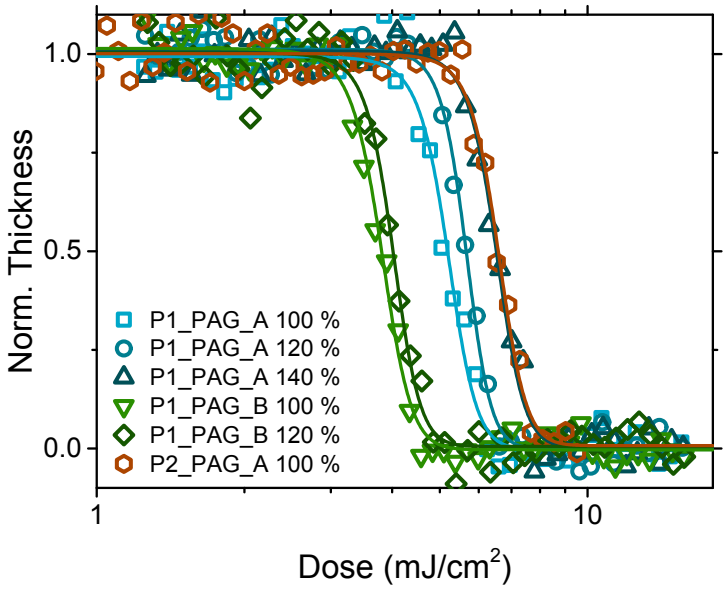


Figure S3.

Dosage curves for the samples of chemically amplified resists: samples with photoacid generator (top) and without (bottom).



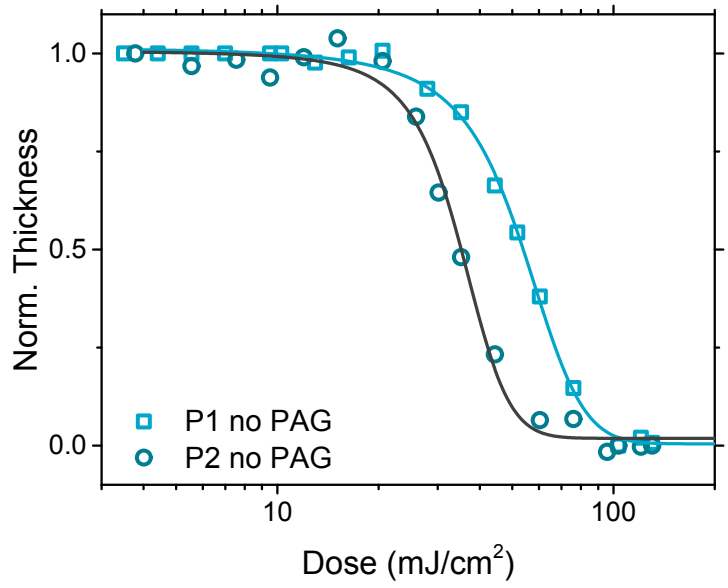
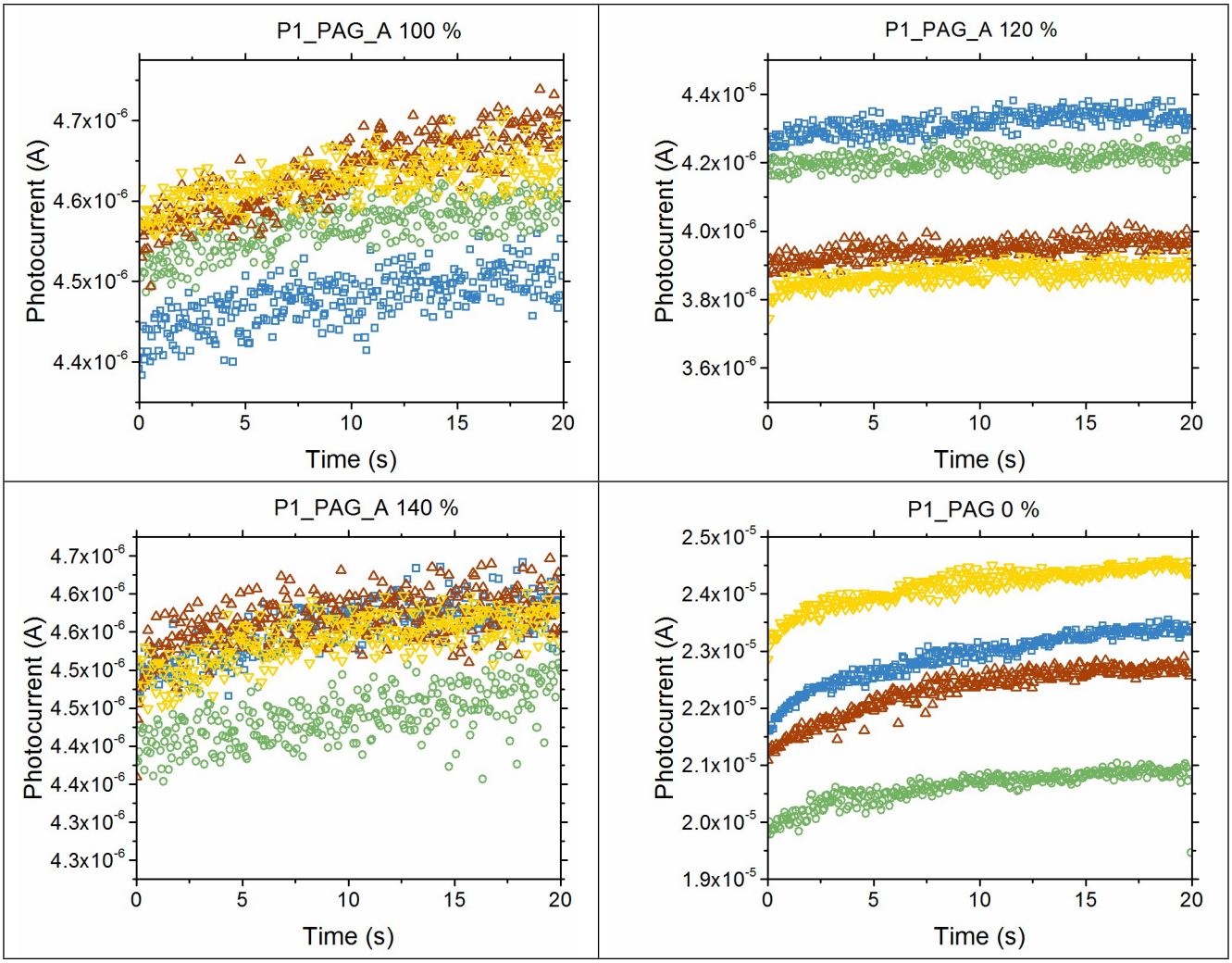
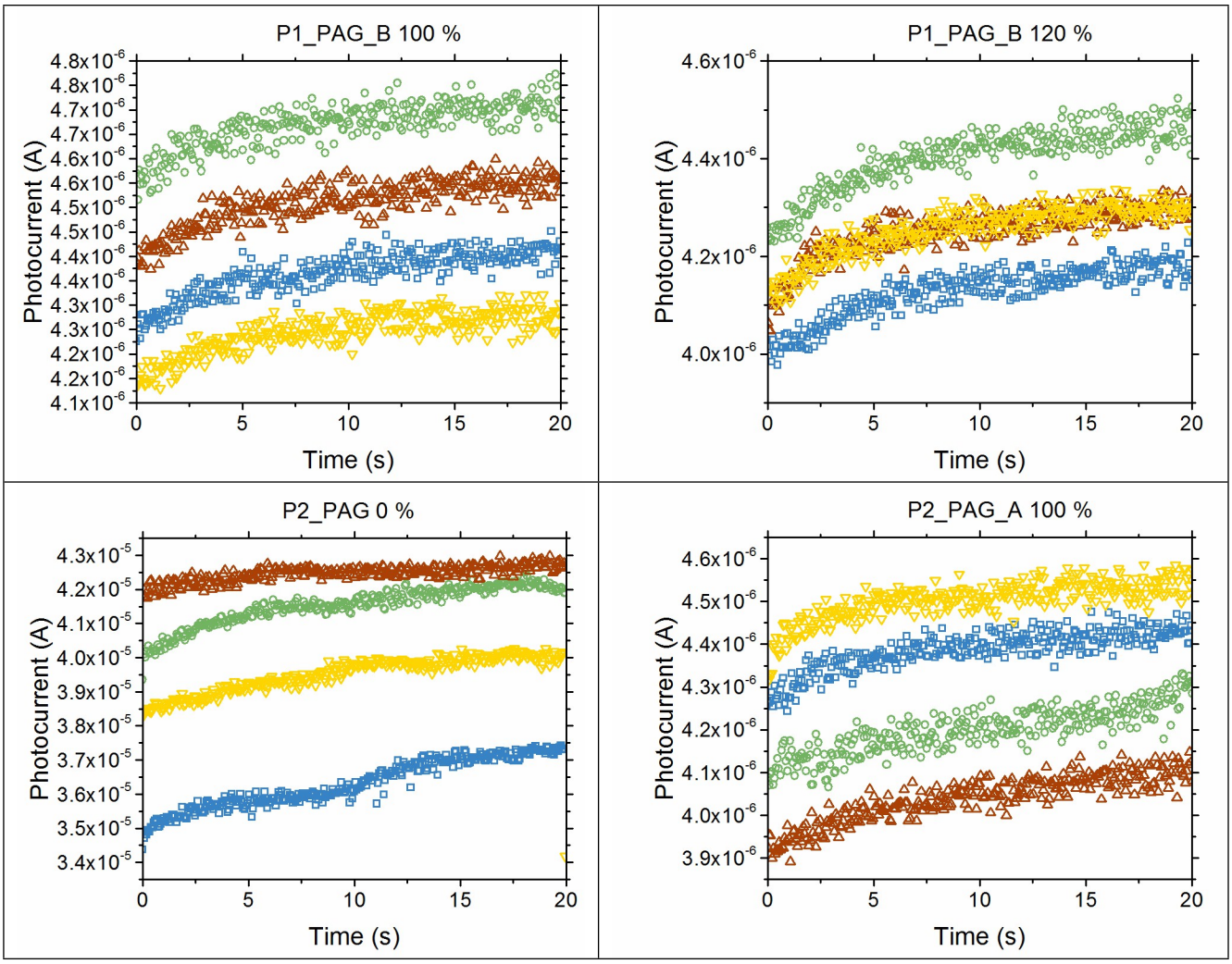


Figure S4.

Raw data of measured transmittance (photocurrent in the diode as a function of time) through the thin photoresist films investigated in this work.




P1_PAG_B 100 %
Photocurrent (A)
Time (s)
P1_PAG_B 120 %
Photocurrent (A)
Time (s)
P2_PAG 0 %
Photocurrent (A)
Time (s)
P2_PAG_A 100 %
Photocurrent (A)
Time (s)