Supporting Information

Title: Atmospheric pulsed plasma copolymerization of acrylic monomers:

kinetics, chemistry and applications.

Maryline Moreno-Couranjou^{1,*}, Jérôme Guillot¹, Jean-Nicolas Audinot¹, Jérôme Bour¹, Emilie Prouvé^{2,3,4}, Marie-Christine Durrieu^{2,3,4}, P. Choquet¹, Christophe Detrembleur⁵



Figure S1. SEM pictures of DMA-homopolymers deposited at a fixed 1 ms t_{on} and t_{off} values ranging from 10 ms to 120 ms.

Table S1. Ion assignments of oligomers (m/z) detected by ESI-HRMS analysis of DMAhomopolymer deposited at 1 ms ton and 60 ms toff.

Ion assignments	$D_{100}E_0, m/z$		
CH ₂ =C -(CH ₂ -CH) _n -H + H] ⁺	199.1441 (n=1), 298.2125 (n=2),		
ċ=o ċ=o	397.2809 (n=3)		
	496.3493 (n=4)		
H_3C CH_3H_3C CH_3	595.4178 (n=5)		
	694.4862 (n=6)		
H-(CH ₂ -CH) _n -H + H]*	201.1597 (n=2),		
¢=o	300.2282 (n=3),		
ц с ^Ń .СН.	399.2966 (n=4),		
H ₃ C CH ₃	498.3650 (n=5), 597.4334 (n=6),		
	696.5018 (n=7),		
H_3C	145.1335 (n=1),		
H_3C I $C-O$	244.2019 (n=2),		
	343.2704 (n=3),		
H ₃ C [/] CH ₃	442.3388 (n=4),		
• •	541.4072 (n=5),		
	640.4756 (n=6), 739.5440 (n=7),		
$CH_2=C-(CH_2-CH)_n-H+H]^+$	156.1019 (n=1)		
Ċ=O Ċ=O	255.1703 (n=2),		
H N	354.2387 (n=3),		
$H_3C^{\prime} \rightarrow CH_3$	453.3071 (n=4),		
	552.3756 (n=5), 651.4440 (n=6),		
	750.5124 (n=7),		

Table S2. Ion assignments of oligomers (m/z) detected by AP-MALDI-HRMS analyses of

Ion assignments	D100E0	D85E15	D75E25
	m/z	m/z	m/z
CH ₂ =C -(CH ₂ -CH) _n -H + H] ⁺	199.1441 (n=1),	199.1441 (n=1),	199.1441 (n=1),
¢=0	298.2125 (n=2),	298.2125 (n=2),	298.2125 (n=2),
	397.2809 (n=3)	397.2809 (n=3)	397.2809 (n=3)
H_3C CH_3H_3C' CH_3	496.3493 (n=4)	496.3493 (n=4)	496.3493 (n=4)
	595.4178 (n=5)	595.4178 (n=5)	595.4178 (n=5)
	694.4862 (n=6)	694.4862 (n=6)	
	793.5546 (n=7)		
	892.6230 (n=8)		
	201.1597 (n=2),	201.1597 (n=2),	201.1597 (n=2),
H-(CH ₂ -CH) ₀ -H + H]*	300.2282 (n=3),	300.2282 (n=3),	300.2282 (n=3),
C=O	399.2966 (n=4),	399.2966 (n=4),	399.2966 (n=4),
i - N	498.3650 (n=5),	498.3650 (n=5),	498.3650 (n=5),
H ₃ C CH ₃	597.4334 (n=6),	597.4334 (n=6),	597.4334 (n=6),
	696.5018 (n=7),	696.5018 (n=7),	
	795.5702 (n=8)		
	894.6386 (n=9)		
	993.7071 (n=10)		
	1092.7755 (n=11)		
	145.1335 (n=1),	145.1335 (n=1),	145.1335 (n=1),
H_3C	244.2019 (n=2),	244.2019 (n=2),	244.2019 (n=2),
	343.2704 (n=3),	343.2704 (n=3),	343.2704 (n=3),
	442.3388 (n=4),	442.3388 (n=4),	442.3388 (n=4),
5 5	541.4072 (n=5),	541.4072 (n=5),	541.4072 (n=5),
	640.4756 (n=6),	640.4756 (n=6),	640.4756 (n=6),
	739.5440 (n=7),		
	838.6124 (n=8),		
	937.6808 (n=9)		
$CH_2=C-(CH_2-CH)_n-H + H]^+$	156.1019 (n=1)	156.1019 (n=1)	156.1019 (n=1)
Ċ=O Ċ=O	255.1703 (n=2),	255.1703 (n=2),	255.1703 (n=2),
H N	354.2387 (n=3),	354.2387 (n=3),	354.2387 (n=3),
H ₃ C′ `CH ₃	453.3071 (n=4),	453.3071 (n=4),	453.3071 (n=4),
	552.3756 (n=5),	552.3756 (n=5),	552.3756 (n=5),
	651.4440 (n=6),	651.4440 (n=6),	651.4440 (n=6),
	750.5124 (n=7),		
	849.5808 (n=8),		
	948.6492 (n=9)		

different DMA/EGDMA plasma copolymers deposited at 1 ms t_{on} and 60 ms $t_{\text{off}}.$

	300.1805 (n=1,	300.1805 (n=1,
CH ₃	m=1)	m=1)
^I H-(CH ₂ -CH) _n - (CH ₂ -C) _m -H + H]⁺	399.2490 (n=2,	399.2490 (n=2,
Ç=0	m=1)	m=1)
	498.2698 (n=1,	498.2698 (n=1,
$H_{3}C$ CH_{3} $(CH_{2})_{2}$	m=2)	m=2)
Ó	498.3174 (n=3,	498.3174 (n=3,
Ċ=O	m=1)	m=1)
C-CH ₃	597.3382 (n=2,	597.3382 (n=2,
CH ₂	m=2)	m=2)
	597.3858 (n=4,	597.3858 (n=4,
	m=1)	m=1)
	,	696.3590 (n=1,
	696.4066 (n=3,	m=3)
	m=2)	
	696.4542 (n=5,	
	m=1)	795.4274 (n=2,
	795.4274 (n=2,	m=3)
	m=3)	
CH ₃	397.2333 (n=1,	397.2333 (n=1,
CH ₂ =C -(CH ₂ -CH) _n - (CH ₂ -C) _m -H + H] ⁺	m=1)	m=1)
¢=0 ¢=0 ¢=0	496.3017 (n=2,	496.3017 (n=2,
N N Ó H-C´CH-H-C´`CH3 I	m=1)	m=1)
(CH ₂) ₂	595.3225 (n=1,	595.3225 (n=1,
0	m=2)	m=2)
	595.3701 (n=3,	595.3701 (n=3,
	m=1)	m=1)
	694.3909 (n=2,	694.3909 (n=2,
	m=2)	m=2)
	793.4117 (n=1,	793.4117 (n=1,
	m=3)	m=3)
		991.5009 (n=1,
		m=4)
	343.2227 (n=1,	343.2227 (n=1,
CH ₃	m=1)	m=1)
$H_{3}C$ N-(CH ₂ -CH) _n - (CH ₂ -C) _m -H + H] ⁺	442.2912 (n=2,	442.2912 (n=2,
	m=1)	m=1)
N O HaCANCHa I	541.3120 (n=1,	541.3120 (n=1,
(CH ₂) ₂	m=2)	m=2)
0 	541.3596 (n=3,	541.3596 (n=3,
C=0	m=1)	m=1)
C-CH ₃	640.3804 (n=2,	640.3804 (n=2,
CH ₂	m=2)	m=2)
	640.4280 (n=4,	640.4280 (n=4,

	m=1)	m=1)
	739.4012 (n=1,	
	m=3)	739.4488 (n=3,
	739.4488 (n=3,	m=2)
	m=2)	
CH ₃	354.1911 (n=1,	354.1911 (n=1,
CH ₂ =C-(CH ₂ -CH) _n - (CH ₂ -C) _m -H + H] ⁺	m=1)	m=1)
Ċ=O Ċ=O Ċ=O	453.2595 (n=2,	453.2595 (n=2,
H N O H2C´ `CH2 I	m=1)	m=1)
(CH ₂) ₂	552.2803 (n=1,	552.2803 (n=1,
О 	m=2)	m=2)
C=O	552.3279 (n=3,	552.3279 (n=3,
C-CH ₃	m=1)	m=1)
CH ₂	651.3487 (n=2,	651.3487 (n=2,
	m=2)	m=2)
	651.3964 (n=4,	651.3964 (n=4,
	m=1)	m=1)
		750.4171 (n=3,
	750.3695 (n=1,	m=2)
	m=3)	750.3695 (n=1,
	750.4648 (n=5,	m=3)
	m=1)	
	849.4379 (n=2,	
	m=3)	



 $\label{eq:Figure S2. SEM pictures of plasma polymer films deposited from different DMA/EGDMA precursor$

mixtures, at a fixed 1 ms $t_{\rm on}$ and a fixed 60 ms $t_{\rm off.}$



Figure S3. AFM pictures of plasma polymer films from pure DMA, pure EGDMA and different DMA/EGDMA mixtures.



Figure S4. Water Contact Angle (WCA) values as a function of the amount of EGDMA in the feed (f_{EGDMA}).

The WCA evolution as a function of the f_{EGDMA} is reported in **Figure S4**. Increasing EGDMA content in the feed up to 20 mol% led to an increase in the film hydrophobicity, from 10° for pure DMA-films, up to 70°, a value close to the pure EGDMA-film one. In addition, coatings issued from f_{EGDMA} superior or equal to 35 mol% presented similar wetting properties, with a WCA of about 70°. Such results suggested the existence of a thin EGDMA-based layer on the topmost surface of the coating.



Figure S5. IR spectra of $D_{65}E_{35}$ films as deposited (a) and after 2h20 water immersion tests (b).