

## Supplementary information for “Photo-crosslinking of polyethylene by mono- and di-acetophenone derivatives and their precursors”

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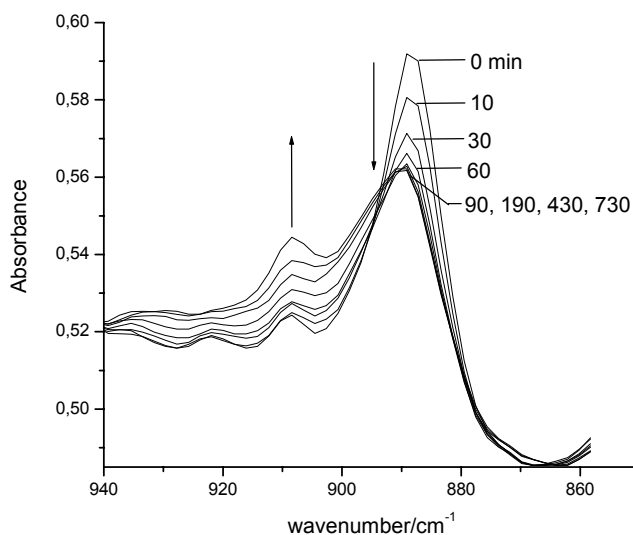
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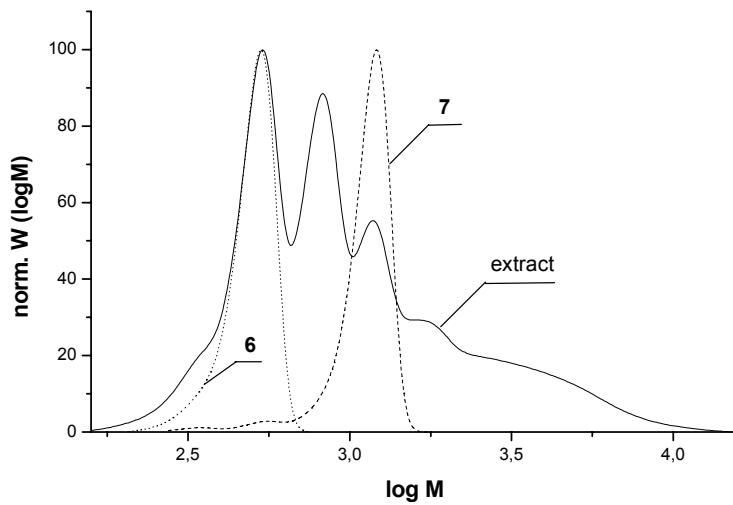
S1. Comparison of the C=O absorption stretching band frequency maxima in FT-IR spectra of the dopant ketones **4**, **6**, **7** and **8** in hexane solutions and in KBr pellets.

ketone	Wavenumbers [cm <sup>-1</sup> ]	
	hexane	KBr
<b>4</b>	1694	1679
<b>6</b>	1694	1677
<b>7</b>	1692 <sup>a</sup>	1685
<b>8</b>	1697 <sup>a</sup>	1685

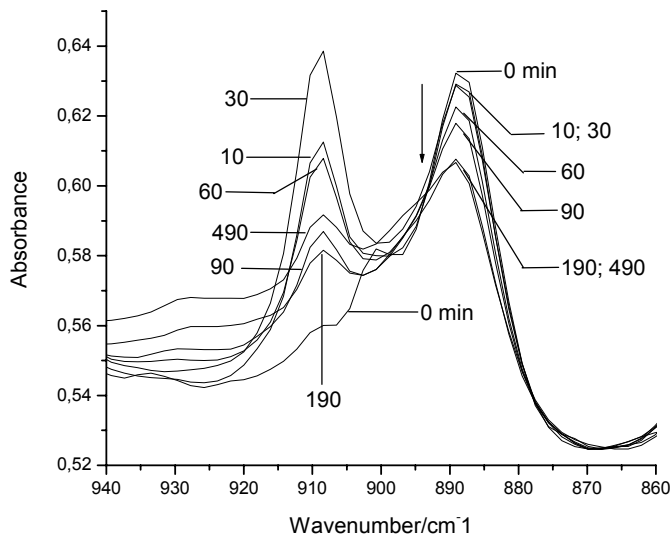
<sup>a</sup> poor solubility



S2. FT-IR spectral changes for 2,2-di(4-acetylphenyl)propane (**4**) (0.036 mol/kg) in a PE film as a function of irradiation time.



S3. Size exclusion chromatogram of 1,10-di(4-nonanoylphenyl)decane (**7**), 1,10-di(4-acetylphenyl)decane (**6**) and the extract from a **PE** film containing **7** that was irradiated for 1 h.



S4. FT-IR spectral changes for 1,10-di(4-nonanoylphenyl)decane (**7**) (0.036 mol/kg) in **PE** films as a function of irradiation time.

S5. Low molecular-mass products from 45 min irradiation of **7** in a **PE** film as estimated by GC-MS.

Compound <sup>a</sup> / (mol %)	Elution time (min)	Area (%)	m/z peaks and intensities (%)
<b>7</b> /12.7	17.09	16.5	574-M (48,); 476 (36); 391 (65); 378 (26); 245 (48); 217 (72); 189 (88); 182 (72); 174 (100); 133 (65); 131 (69); 105 (48); 91 (48)
<b>10</b> /1.2	15.86	1.6	556-M-H <sub>2</sub> O (42,); 538 (66); 476 (22); 458 (34); 391 (48); 245 (35); 219 (59); 217 (59); 199 (53); 157 (58); 143 (68); 133 (100); 131 (98); 105 (58); 91 (52)
<b>12</b> /0.2	14.96	0.3	556-M-H <sub>2</sub> O (34); 538 (48); 458 (42); 440 (59); 217 (36); 199 (47); 157 (58); 155 (70); 143 (93); 133 (84); 129 (70); 117 (43); 91 (62); 71 (65); 57 (100); 43 (58)
<b>9</b> /27.3	13.12	29.3	476-M (39); 378 (72); 363 (53); 321 (19); 245 (22); 217 (38); 182 (49); 174 (100); 147 (46); 131 (37); 105 (28); 91 (40)
Unknown	12.85	0.7	474 (60); 472 (32); 456 (22); 363 (48); 215 (49); 174 (100); 131 (47); 105 (36); 91 (37); 43 (44)
<b>11-trans</b> /8.6	12.68	9.3	458 (39); 440 (17); 391 (22); 378 (93); 232 (22); 217 (51); 199 (22); 181 (50); 157 (35); 147 (100); 133 (71); 118 (26); 105 (42); 91 (42); 43 (50)
<b>11-cis</b> /2.5	12.55	2.7	458 (71); 440 (31); 401 (45); 378 (78); 217 (39); 199 (50); 181 (48); 157 (78); 147 (100); 143 (82); 133 (72); 131 (82); 117 (39); 105 (62); 91 (53); 43 (80)
<b>6</b> /45.4	11.16	38.7	378 (83); 363 (7); 336 (7); 321 (8); 232 (14); 174 (88); 147 (100); 134 (47); 105 (35); 91 (32); 43 (33)
Unknown	10.89	1.2	362 (66); 260 (44); 175 (29); 159 (35); 147 (46); 145 (51); 131 (44); 118 (77); 117 (100); 105 (27); 91 (46); 43 (47)

<sup>a</sup>See Scheme 3

S6. Low molecular-mass products isolated from 45 min irradiation of **8** in a **PE** film as estimated by GC-MS.

Compound <sup>a</sup> / concentration (wt %)	Elution time (min)	m/z peaks and intensities (%)
<b>8</b> /47.4	11.42	322 (M; 0.6); 304 (6); 286 (3); 203 (34); 133 (9); 120 (43); 105 (100); 77 (31);
<b>16</b> /5.0	11.07	304 (M-H <sub>2</sub> O; 5); 286 (M-2H <sub>2</sub> O; 2); 203 (17); 156 (17); 143 (24); 120 (44); 105 (100); 77 (37);
<b>13</b> /18.1	6.35	202 (M; 2); 146 (9); 133 (11); 120 (73); 105 (100); 77 (38);
<b>17</b> /21.9	5.90	174 (M; 9); 159 (3); 146 (7); 143 (7); 133 (45); 120 (100); 105 (57); 77 (22);
<b>18</b> /0.4	3.80	148 (M; 100); 133 (29); 105 (94); 91 (38); 79 (27); 77 (26); 43 (52)
<b>2</b> /7.2	2.56	120 (M; 33); 105 (100); 77 (67); 51 (17)

<sup>a</sup>See Scheme 4