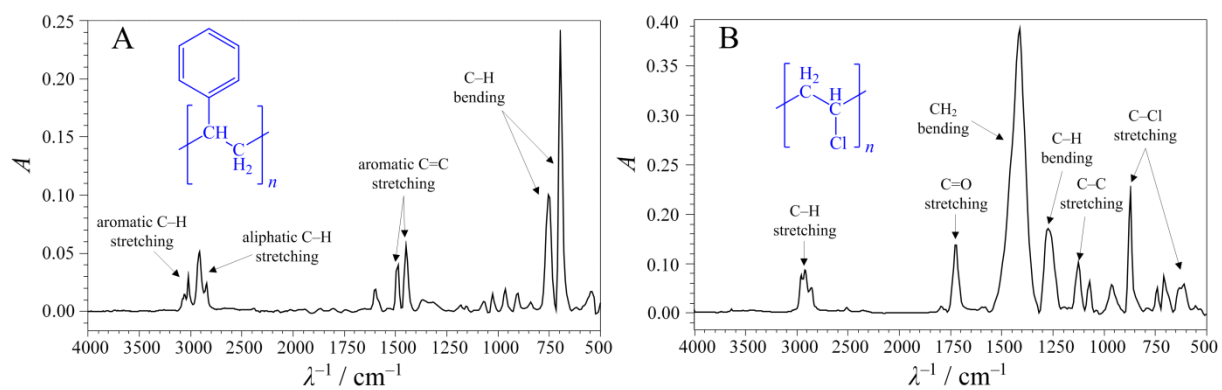


## Supplementary material



**Figure S1.** FTIR spectra of untreated MPs samples with the characteristic bands indicated: A) PS MPs and B) PVC MPs. The chemical structures of the mentioned polymers are shown in blue.

**Table S1.** Statistical analysis of the fitted response surface models (Equations (1)–(4)) for MPs treated with UV-C/H<sub>2</sub>O<sub>2</sub> or UV-C/S<sub>2</sub>O<sub>8</sub><sup>2-</sup>. The analysis was performed with a significance of  $p < 0.050$ .

MPs	MODEL	$df^1$	UV-C/H <sub>2</sub> O <sub>2</sub>				UV-C/S <sub>2</sub> O <sub>8</sub> <sup>2-</sup>			
			$R^2$	$R^2_{adj}$	$F$	$p$	$R^2$	$R^2_{adj}$	$F$	$p$
PS	I	23	0.8584	0.8399	46.48	0.000	0.8297	0.8075	37.35	0.000
	II	20	0.8803	0.8444	24.51	0.000	0.8474	0.8016	18.51	0.000
	III	20	0.9361	0.9169	48.83	0.000	0.8893	0.8561	26.78	0.000
	IV	17	0.9580	0.9357	43.06	0.000	0.9070	0.8578	18.42	0.000
PVC	I	23	0.6658	0.6222	15.27	0.000	0.7108	0.6731	18.85	0.000
	II	20	0.7225	0.6393	8.68	0.000	0.8002	0.7403	13.35	0.000
	III	20	0.8743	0.8366	23.18	0.000	0.7965	0.7355	13.05	0.000
	IV	17	0.9310	0.8945	25.50	0.000	0.8859	0.8254	14.66	0.000

<sup>1</sup>  $df$  = degrees of freedom

**Table S2.** Estimated values of the coefficients of the RSM models selected as optimal for the applied AOP treatments (according to Equation (4)) and the results of the  $t$ -test presented in the form of  $p$ -values. The calculations were performed with a significance level of  $p < 0.050$ .

MPs	Coefficients	UV-C/H <sub>2</sub> O <sub>2</sub>					UV-C/S <sub>2</sub> O <sub>8</sub> <sup>2-</sup>				
		$t$ -statistics		Influential variables <sup>1</sup>			$t$ -statistics		Influential variables <sup>1</sup>		
		$t$	$p$	$x_1$	$x_2$	$x_3$	$t$	$p$	$x_1$	$x_2$	$x_3$
PS	$a_0 = -13.2$	-2.442	0.025				$a_0 = -27.0$	-3.164	0.006		
	$a_1 = 2.85 \cdot 10^{-1}$	2.648	0.017	YES			$a_1 = 4.33 \cdot 10^{-1}$	2.534	0.021	YES	
	$a_2 = 8.04 \cdot 10^{-1}$	3.324	0.004		YES		$a_2 = 9.61 \cdot 10^{-1}$	2.507	0.023		YES
	$a_3 = 6.40$	5.299	0.000			YES	$a_3 = 7.09$	3.703	0.018		YES
	$a_4 = -7.95 \cdot 10^{-18}$	0.000	0.999				$a_4 = -2.04 \cdot 10^{-3}$	-0.710	0.487		
	$a_5 = -3.09 \cdot 10^{-3}$	-0.539	0.597				$a_5 = -1.37 \cdot 10^{-2}$	-1.514	0.148		
	$a_6 = -5.29 \cdot 10^{-2}$	-2.926	0.009		YES	YES	$a_6 = -1.90 \cdot 10^{-2}$	-0.663	0.516		
	$a_7 = -1.34 \cdot 10^{-4}$	-0.165	0.871				$a_7 = -6.11 \cdot 10^{-4}$	-0.476	0.640		
	$a_8 = -1.07 \cdot 10^{-2}$	-1.325	0.203				$a_8 = -1.92 \cdot 10^{-2}$	-1.501	0.152		
	$a_9 = -4.41 \cdot 10^{-1}$	-5.444	0.000			YES	$a_9 = -3.72 \cdot 10^{-1}$	-2.901	0.010		YES
PVC	$a_0 = -34.9$	-2.255	0.038				$a_0 = 54.8$	13.713	0.000		
	$a_1 = 7.99 \cdot 10^{-1}$	2.585	0.019	YES			$a_1 = 1.33 \cdot 10^{-1}$	1.668	0.114		
	$a_2 = 2.23$	3.215	0.005		YES		$a_2 = 8.14 \cdot 10^{-1}$	4.537	0.000		YES
	$a_3 = 21.0$	6.062	0.000			YES	$a_3 = 1.92$	2.139	0.047		YES
	$a_4 = -3.73 \cdot 10^{-3}$	-0.719	0.482				$a_4 = -4.60 \cdot 10^{-3}$	-3.429	0.003	YES	YES
	$a_5 = -5.58 \cdot 10^{-2}$	-3.392	0.003	YES		YES	$a_5 = 5.14 \cdot 10^{-3}$	1.211	0.242		
	$a_6 = -7.28 \cdot 10^{-1}$	-1.402	0.179				$a_6 = -4.12 \cdot 10^{-3}$	-0.307	0.762		
	$a_7 = -1.85 \cdot 10^{-3}$	-0.798	0.436				$a_7 = -2.67 \cdot 10^{-4}$	-0.445	0.662		
	$a_8 = -5.71 \cdot 10^{-2}$	-2.462	0.025		YES		$a_8 = -1.64 \cdot 10^{-2}$	-2.732	0.014		YES
	$a_9 = -1.55$	-6.686	0.000			YES	$a_9 = -1.36 \cdot 10^{-1}$	-2.259	0.037		YES

<sup>1</sup>  $x_1$  = treatment duration;  $x_2$  = molar concentration of oxidizing agent;  $x_3$  = pH