Enzyme Immobilization on Stimuli-Responsive Hydrogels - Part B. Impact of Carrier Responsiveness on Reactor Performance

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RESULTS

This Supplementary Information file contains the numerical values of the data points presented in the main publication. This dataset is available through an external repository, accompanied by a descriptive README file: https://doi.org/10.15480/882.16797.

Table S 1. Reaction yield for varying flow rates, comparing the different hydrogel carrier materials.

Hydrogel	Flow Rate (mL/min)	Yield (-)
p(HEMA-co-IA)	0.25 ± 0.01	0.098 ± 0.021
p(HEMA-co-IA)	0.30 ± 0.01	0.074 ± 0.022
p(HEMA-co-IA)	0.45 ± 0.01	0.053 ± 0.012
p(HEMA-co-IA)	0.90 ± 0.01	0.031 ± 0.010
p(HEMA-co-IA)	2.30 ± 0.03	0.014 ± 0.006
p(NIPAM-co-IA)	0.25 ± 0.01	0.063 ± 0.010
p(NIPAM-co-IA)	0.30 ± 0.01	0.047 ± 0.002
p(NIPAM-co-IA)	0.45 ± 0.01	0.051 ± 0.008
p(NIPAM-co-IA)	0.90 ± 0.01	0.039 ± 0.014
p(NIPAM-co-IA)	2.30 ± 0.03	0.015 ± 0.004
pNIPAM	0.25 ± 0.01	0.011 ± 0.008
pNIPAM	0.30 ± 0.01	0.013 ± 0.002
pNIPAM	0.45 ± 0.01	0.011 ± 0.001
pNIPAM	0.90 ± 0.01	0.007 ± 0.001
pNIPAM	2.30 ± 0.03	0.004 ± 0.001

Table S 2. Relative yield of temperature-responsive hydrogels and silica as non-responsive reference, comparing constant and fluctuating conditions.

Hydrogel	Time (h)	Relative Yield at Fluctuating Conditions (-)	Relative Yield at Constant Conditions (-)
pNIPAM	1.0	1.00 ± 0.00	1.00 ± 0.00
pNIPAM	1.5	1.14 ± 0.05	1.02 ± 0.03
pNIPAM	2.0	1.09 ± 0.05	1.03 ± 0.05
pNIPAM	2.5	2.41 ± 0.01	1.00 ± 0.04
pNIPAM	3.0	1.97 ± 0.10	1.03 ± 0.06
pNIPAM	3.5	1.11 ± 0.10	1.03 ± 0.12
pNIPAM	4.0	0.77 ± 0.07	0.98 ± 0.12
pNIPAM	4.5	0.53 ± 0.08	0.98 ± 0.15
pNIPAM	5.0	0.34 ± 0.01	0.97 ± 0.15
pNIPAM	5.5	0.34 ± 0.04	0.95 ± 0.17
pNIPAM	6.0	0.39 ± 0.04	0.84 ± 0.15
p(NIPAM-co-IA)	1.0	1.00 ± 0.00	1.00 ± 0.00
p(NIPAM-co-IA)	1.5	1.01 ± 0.09	1.05 ± 0.03
p(NIPAM-co-IA)	2.0	1.07 ± 0.11	1.10 ± 0.05
p(NIPAM-co-IA)	2.5	1.62 ± 0.14	1.14 ± 0.06
p(NIPAM-co-IA)	3.0	1.94 ± 0.14	1.24 ± 0.08
p(NIPAM-co-IA)	3.5	1.75 ± 0.11	1.24 ± 0.06
p(NIPAM-co-IA)	4.0	1.73 ± 0.12	1.20 ± 0.07
p(NIPAM-co-IA)	4.5	1.09 ± 0.06	1.23 ± 0.08
p(NIPAM-co-IA)	5.0	0.89 ± 0.10	1.26 ± 0.09
p(NIPAM-co-IA)	5.5	1.02 ± 0.14	1.23 ± 0.09
p(NIPAM-co-IA)	6.0	0.96 ± 0.08	1.22 ± 0.15

silica	1.0	1.00 ± 0.00	1.00 ± 0.00
silica	1.5	0.99 ± 0.06	0.97 ± 0.07
silica	2.0	1.04 ± 0.05	0.91 ± 0.03
silica	2.5	1.12 ± 0.04	0.91 ± 0.02
silica	3.0	1.98 ± 0.21	0.90 ± 0.01
silica	3.5	1.79 ± 0.28	0.89 ± 0.02
silica	4.0	1.65 ± 0.42	0.93 ± 0.04
silica	4.5	0.59 ± 0.04	0.91 ± 0.03
silica	5.0	0.52 ± 0.04	0.89 ± 0.03
silica	5.5	0.68 ± 0.05	0.89 ± 0.04
silica	6.0	0.68 ± 0.05	0.90 ± 0.03

Table S 3. Relative yield of pH-responsive hydrogels and silica as non-responsive reference, comparing constant and fluctuating conditions (pH 8 and 4).

Hydrogel	Time (h)	Relative Yield at Fluctuating Conditions (-)	Relative Yield at Constant Conditions (-)
p(HEMA-co-IA)	1.0	1.00 ± 0.00	1.00 ± 0.00
p(HEMA-co-IA)	1.5	1.07 ± 0.02	1.04 ± 0.04
p(HEMA-co-IA)	2.0	1.07 ± 0.02	1.05 ± 0.03
p(HEMA-co-IA)	2.5	1.17 ± 0.02	1.10 ± 0.09
p(HEMA-co-IA)	3.0	0.90 ± 0.02	0.90 ± 0.19
p(HEMA-co-IA)	3.5	0.75 ± 0.03	1.10 ± 0.15
p(HEMA-co-IA)	4.0	0.65 ± 0.02	1.11 ± 0.13
p(HEMA-co-IA)	4.5	0.61 ± 0.10	1.17 ± 0.17
p(HEMA-co-IA)	5.0	0.79 ± 0.05	1.09 ± 0.11
p(HEMA-co-IA)	5.5	0.87 ± 0.02	1.06 ± 0.17
p(HEMA-co-IA)	6.0	0.93 ± 0.27	1.03 ± 0.17
p(NIPAM-co-IA)	1.0	1.00 ± 0.00	1.00 ± 0.00
p(NIPAM-co-IA)	1.5	0.90 ± 0.09	1.05 ± 0.03
p(NIPAM-co-IA)	2.0	0.98 ± 0.11	1.10 ± 0.05
p(NIPAM-co-IA)	2.5	0.93 ± 0.11	1.14 ± 0.06
p(NIPAM-co-IA)	3.0	0.85 ± 0.08	1.24 ± 0.08
p(NIPAM-co-IA)	3.5	0.78 ± 0.08	1.24 ± 0.06
p(NIPAM-co-IA)	4.0	0.69 ± 0.08	1.20 ± 0.07
p(NIPAM-co-IA)	4.5	1.01 ± 0.04	1.23 ± 0.08
p(NIPAM-co-IA)	5.0	0.98 ± 0.12	1.26 ± 0.09
p(NIPAM-co-IA)	5.5	0.99 ± 0.16	1.23 ± 0.09
p(NIPAM-co-IA)	6.0	0.91 ± 0.10	1.22 ± 0.15

silica	1.0	1.00 ± 0.00	1.00 ± 0.00
silica	1.5	0.98 ± 0.03	0.97 ± 0.07
silica	2.0	0.99 ± 0.03	0.910 ± 0.03
silica	2.5	0.13 ± 0.01	0.91 ± 0.02
silica	3.0	0.45 ± 0.03	0.90 ± 0.01
silica	3.5	0.31 ± 0.02	0.89 ± 0.02
silica	4.0	0.26 ± 0.01	0.93 ± 0.04
silica	4.5	0.16 ± 0.04	0.91 ± 0.03
silica	5.0	0.28 ± 0.12	0.89 ± 0.03
silica	5.5	0.29 ± 0.12	0.89 ± 0.04
silica	6.0	0.28 ± 0.11	0.90 ± 0.03