

Table 1S. Plan of the experiment and pH

Sample	Temperature (A), C°	Time (B), h	APTES/TEOS ratio (C)	pH
T-A 1	20	1	0.25	8.2
T-A 2	20	3	0.5	7.9
T-A 3	20	6	1	6.9
T-A 4	20	18	1.5	6.4
T-A 5	20	24	2	7.7
T-A 6	30	1	0.5	9.0
T-A 7	30	3	1	8.7
T-A 8	30	6	1.5	8.8
T-A 9	30	18	2	8.5
T-A 10	30	24	0.25	7.6
T-A 11	40	1	1	7.3
T-A 12	40	3	1.5	6.6
T-A 13	40	6	2	8.7
T-A 14	40	18	0.25	8.9
T-A 15	40	24	0.5	8.3
T-A 16	50	1	1.5	8.6
T-A 17	50	3	2	9.4
T-A 18	50	6	0.25	7.7
T-A 19	50	18	0.5	8.8
T-A 20	50	24	1	8.2
T-A 21	60	1	2	8.0
T-A 22	60	3	0.25	7.4
T-A 23	60	6	0.5	9.0
T-A 24	60	18	1	9.2
T-A 25	60	24	1.5	8.1

Table 2S - Values of statistical characteristics for choosing the degree of models for the yield of the reaction product (Y1) and zeta potential (Y2)

Source	p-value	Adjusted R ²	Predicted R ²
	Y1		
Linear	0.0332	0.2386	0.0534
Quadratic	<0.0001	0.8451	0.6874
Cubic	0.2671	0.8992	-1.5976
	Y2		
Linear	0.1607	0.101	-0.1559
Quadratic	0.0002	0.7328	0.5863
Cubic	0.8519	0.5889	-18.5102

Table 3S - The result of ANOVA analysis for the yield of the finished reaction product

	Sum square	of	Degree freedom	of	Mean square	F-value	p-value
Model	40,67		9		4,52	15,54	< 0.0001
A-temp	0,1687		1		0,1687	0,5803	0,4580
B-time	0,1603		1		0,1603	0,5512	0,4693
C- APTES/TEOS ratio	12,73		1		12,73	43,77	< 0.0001
AB	0,0759		1		0,0759	0,2609	0,6169
AC	0,0812		1		0,0812	0,2793	0,6049
BC	0,1549		1		0,1549	0,5328	0,4767
A²	0,3546		1		0,3546	1,22	0,2868
B²	0,1240		1		0,1240	0,4264	0,5237
C²	10,19		1		10,19	35,06	< 0.0001
Residual	4,36		15		0,2907		
Cor Total	45,03		24				

Table 4S- Result of ANOVA analysis for zeta potential

	Sum of square	Degree of freedom	Mean square	F-value	p-value
Model	3191,13	9	354,57	8,31	0,0002
A-temp	283,89	1	283,89	6,66	0,0209
B-time	152,08	1	152,08	3,57	0,0785
C-APTES/TEOS ratio	574,31	1	574,31	13,47	0,0023
AB	2073,57	1	2073,57	48,62	< 0.0001
AC	1558,59	1	1558,59	36,54	< 0.0001
BC	1172,52	1	1172,52	27,49	< 0.0001
A ²	906,54	1	906,54	21,25	0,0003
B ²	1525,73	1	1525,73	35,77	< 0.0001
C ²	849,75	1	849,75	19,92	0,0005
Residual	639,77	15	42,65		
Cor Total	3830,9	24			

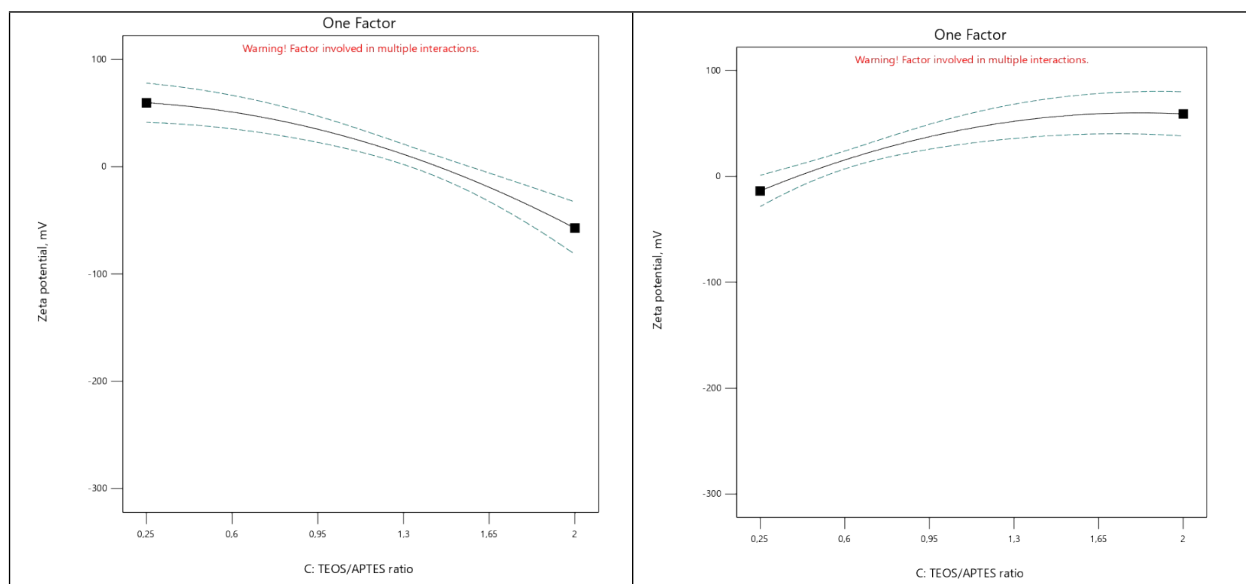


Figure 1S. Zeta potential versus APTES/TEOS ratio at minimum (a, 20°C) and maximum (b, 60°C) temperatures (polymerization time 12 h)

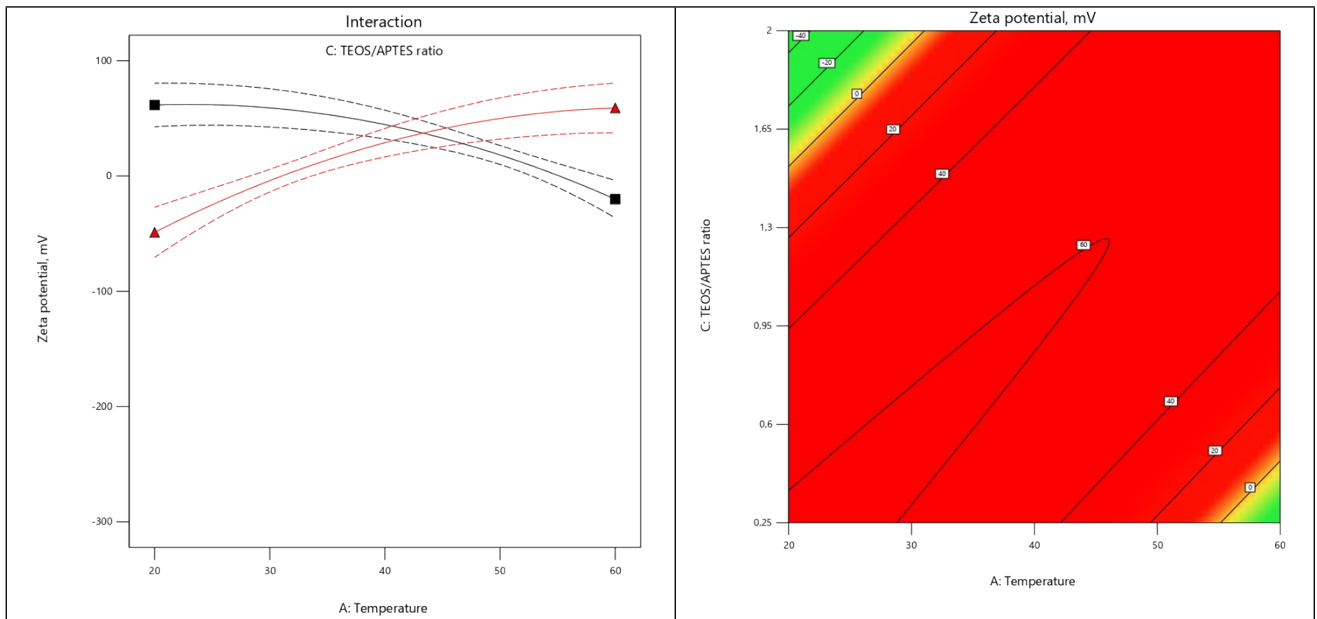
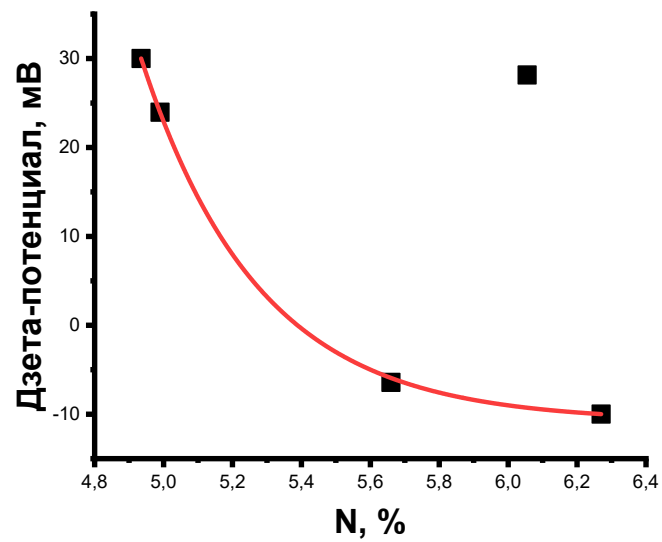


Figure 2S.a) Zeta potential versus temperature of polymerization at minimum (0.25, black square) and maximum (2, red triangle) APTES/TEOS ratio (polymerization time 12 h) b) a plane describing the



dependence of the zeta potential on the ratio of APTES/TEOS and temperature

Fig. 3S Dependence of the zeta potential on the percentage of nitrogen

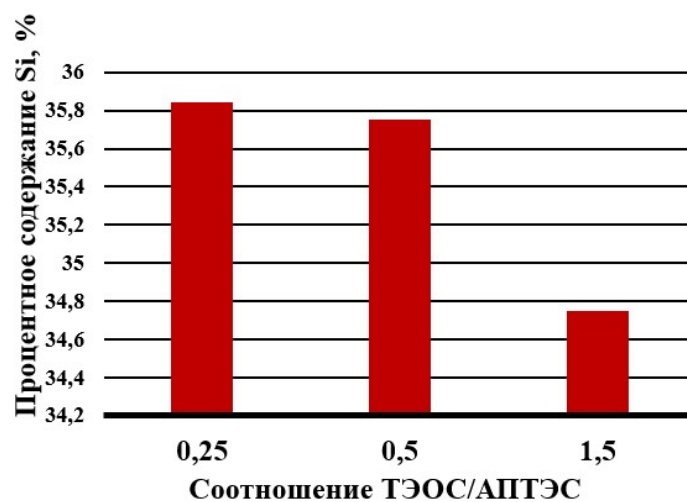


Figure 4S - The dependence of the percentage of silicon on the ratio of APTES/TEOS

Table 5S - Theoretical and actual APTES/TEOS ratio

Sample	APTES/TEOS ratio theoretical, mol/mol	APTES/TEOS ratio. actual, mol/mol
TA 14	1:0.25	1:0.39
TA 18	1:0.25	1:0.37
TA 6	1:0.5	1:0.51
TA 15	1:0.5	1:0.46
TA 25	1:1.5	1:0.56

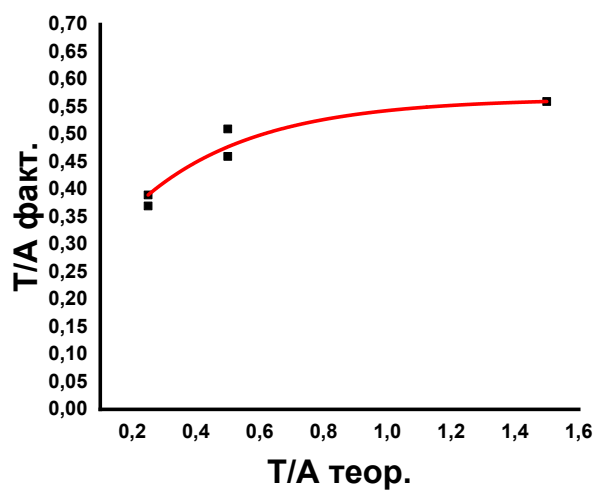
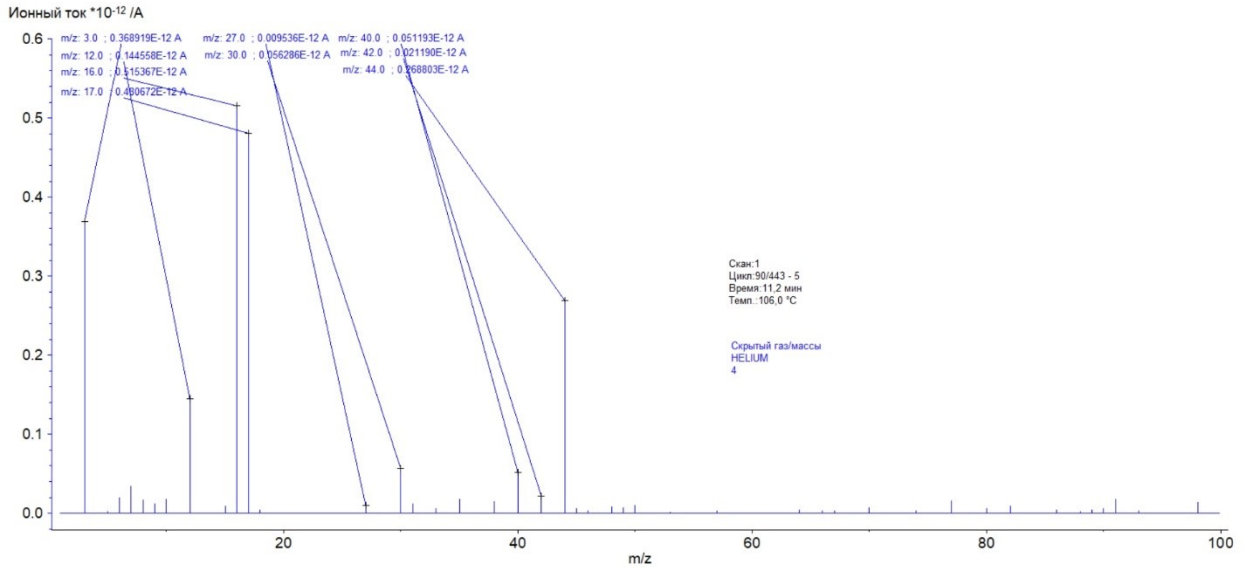
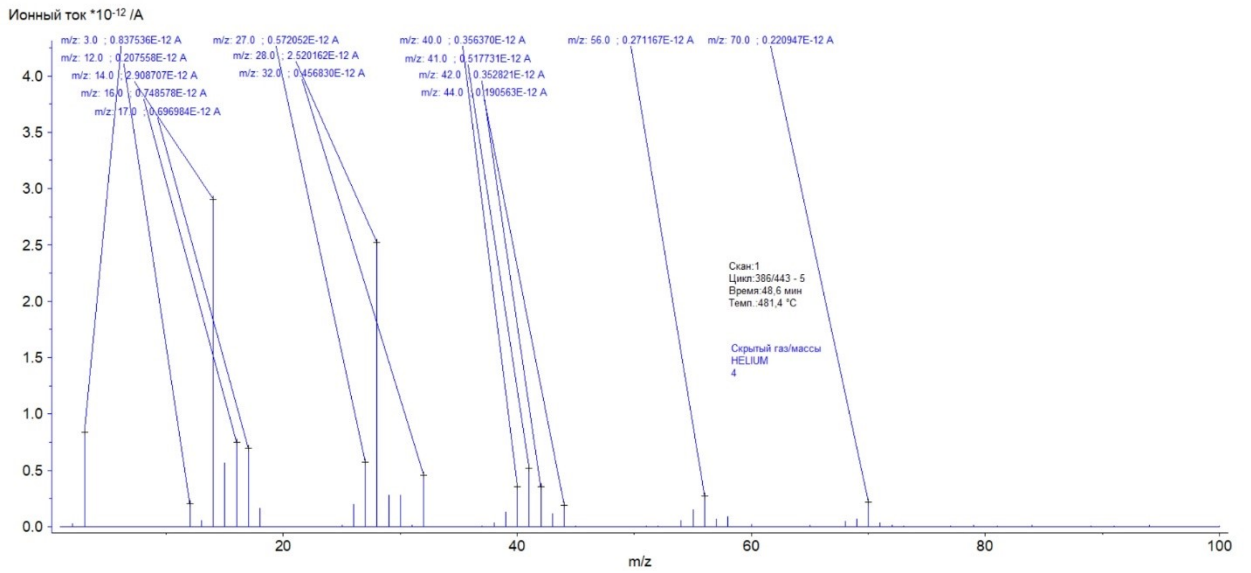


Figure 5S - Dependence of the actual TEOS / APTES ratio on the theoretical

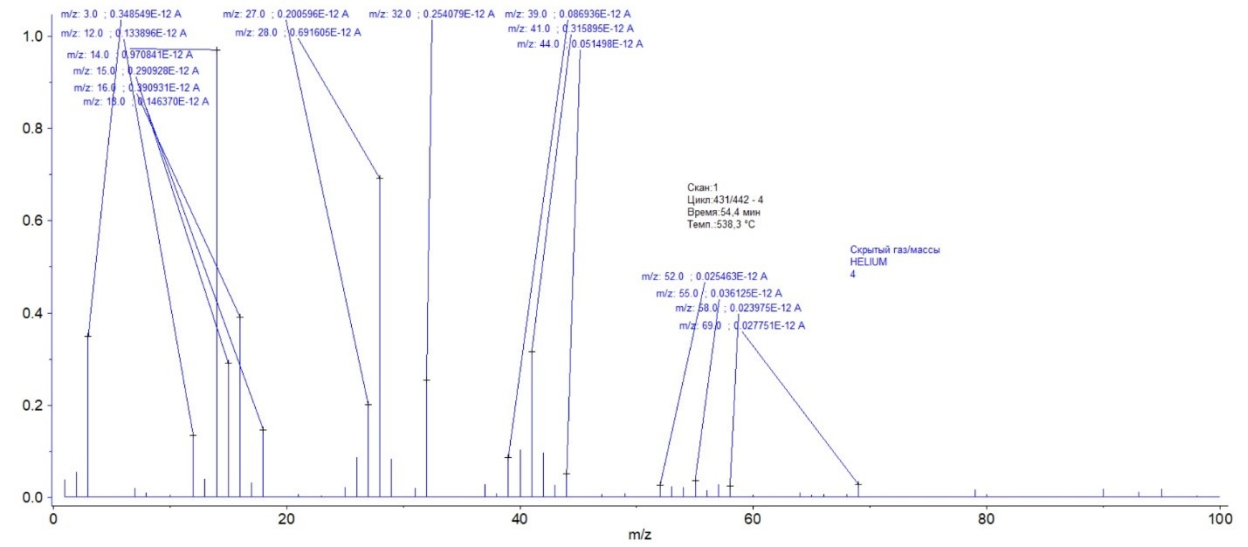


AT 6, t=481.4°C



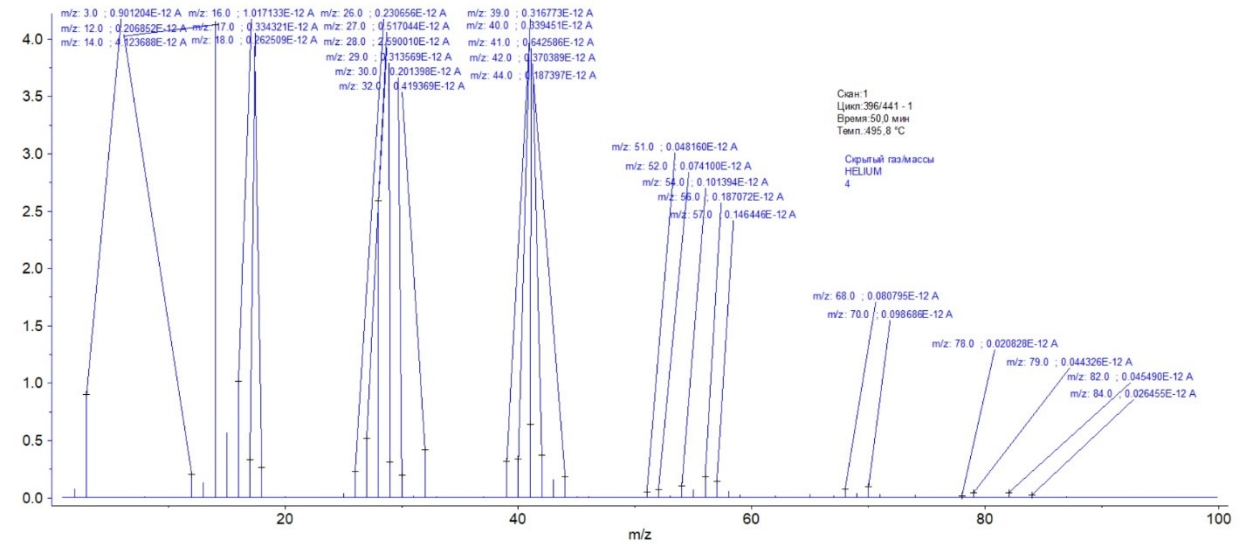
AT 14, t=538.3°C

Ионный ток *10⁻¹² /A

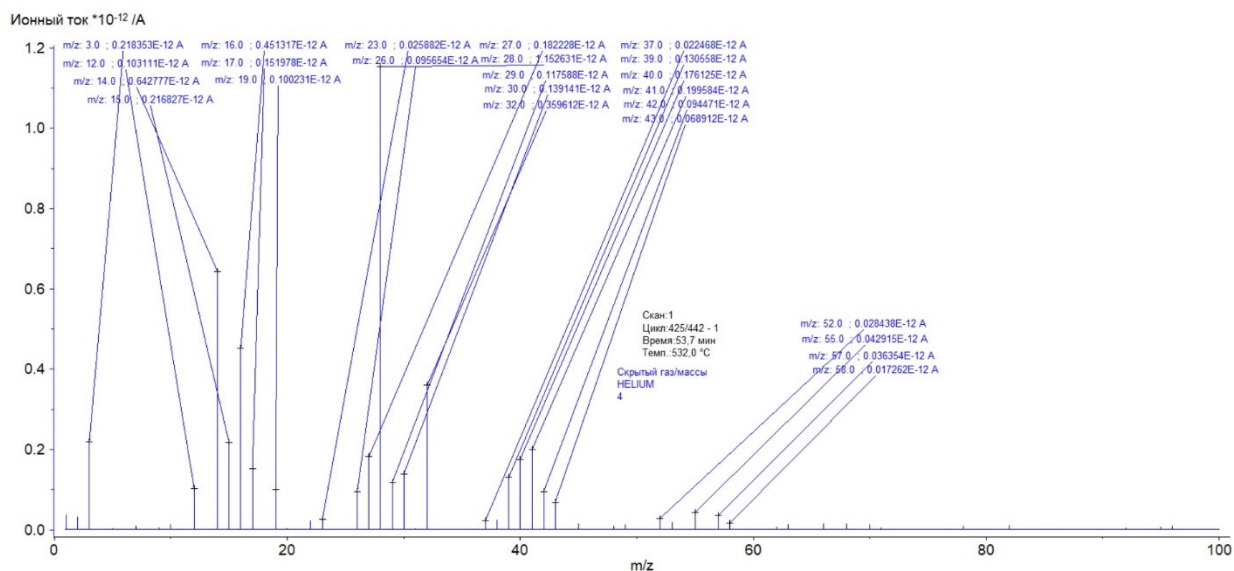


AT 15, t=94.5°C

Ионный ток *10⁻¹² /A



AT 18, t=532.0°C



AT 25, t=97.0°C

Figure 6S. Mass-specter's of NPs

Table 6S. Areas under IR-spectra

	Si-O-Si		-CH ₂		NH ₂ -		OH-	
	FTIR	ATR	FTIR	ATR	FTIR	ATR	FTIR	ATR
TA 14	155,54	96,34	37,59	2,67	6,48	-	38,34	3,05
TA 15	149,07	83,50	33,69	2,65	20,8	-	46,05	2,88
TA 18	142,96	110,94	22,87	2,73	2,74	-	26,49	3,28
TA 25	84,81	10,45	17,08	0,24	15,54	-	29,01	0,33
TA 6	82,87	41,04	10,55	1,02	10,66	-	20,2	1,05