Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary Information

Fixation of atmospheric nitrogen by nanodiamond

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Table S1. Elemental analysis of freshly prepared DND (7 detonation experiments)

sample	C, %	H, %	N, %	sample	C, %	H, %	N, %
i	89.36	0.69	2.41	v	86.99	0.37	2.19
	89.19	0.61	2.42		87.39	0.39	2.17
ii	88.09	0.47	1.97	vi	86.03	0.50	2.18
	87.97	0.24	1.94		86.28	0.35	2.14
iii	87.66	0.55	2.21	vii	84.39	0.61	2.13
	86.99	0.52	2.20		84.07	0.70	2.37
iv	87.42	0.39	2.19				
	87.02	0.41	2.14	**average**	**87.1(1.5)**	**0.49(13)**	**2.19(13)**

Table S2. Elemental analyses of products **1 - 11**

sample	C, %	H, %	N, %	sample	C, %	H, %	N, %
1	70.95	1.47	3.94	**6**	27.14	1.80	1.31
1	69.48	1.22	4.36	**7**	34.34	1.91	1.86
1	68.44	0.88	4.31	**7**	34.36	1.93	2.13
2	53.63	1.35	3.54	**8**	69.69	1.42	2.00
2	52.80	1.31	3.51	**8**	69.59	1.54	1.92
2	49.98	1.24	3.77	**9**	70.43	1.33	1.92
3	51.11	1.20	4.85	**9**	70.62	1.40	1.92
3	51.30	1.45	4.77	**10**	34.91	1.59	2.25
5	42.47	3.26	3.37	**10**	35.20	1.45	2.37
5	42.63	2.78	3.35	**11**	10.42	1.81	2.83
6	27.33	1.81	1.31	**11**	10.74	1.98	2.89

Table S3. X-ray spectral microanalyses of product **1**

	Before annealing	
	wt %	atom %
C	52.86	69.64
O	6.83	6.76
Al[a]	40.07	23.50
S	0.17	0.08
Fe	0.07	0.02

[a] Stub material

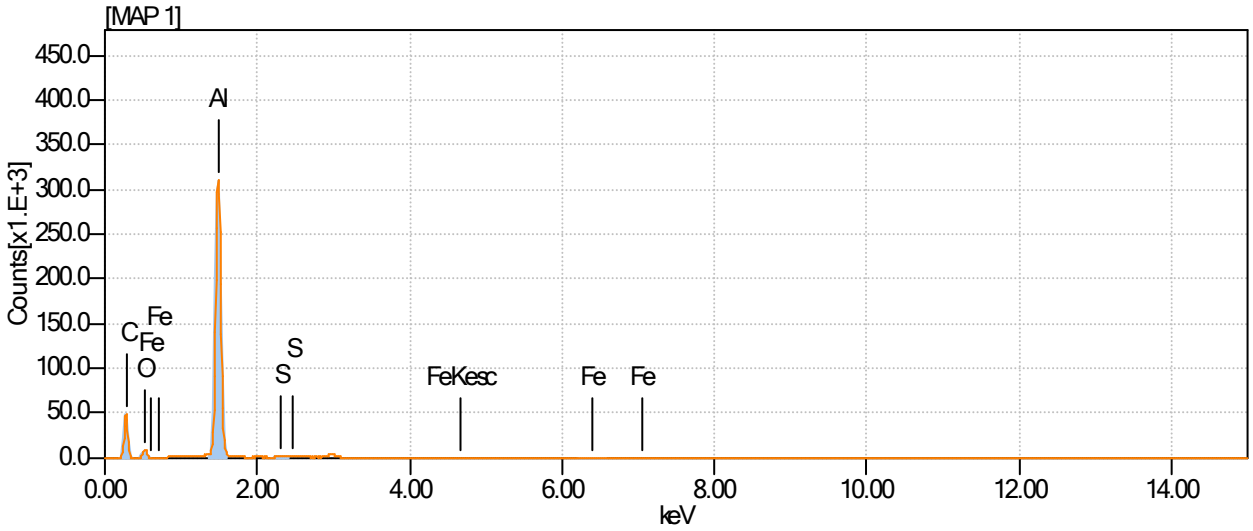

Figure S1. X-ray spectrum of **1**

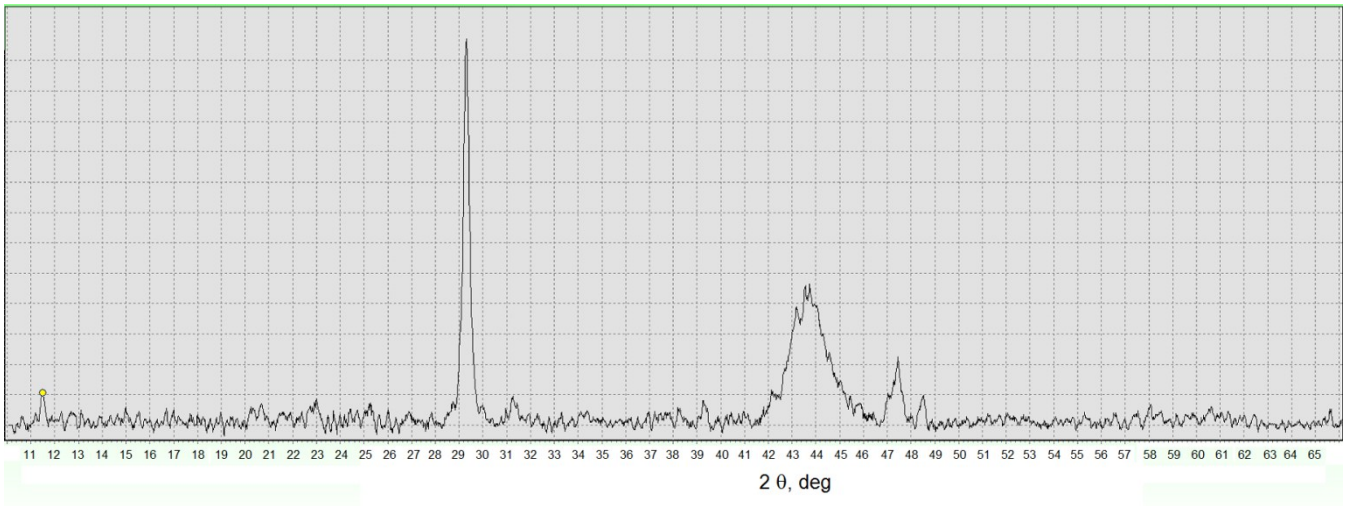

Figure S2. X-ray diffraction pattern of pressed product **2,** Cu-*K*α radiation, λ=1.54056 Å, background subtracted. To improve the intensities, the powders were compressed into disks of 11 to 12 mm diameter with the density of up to 50% of the monolithic, using Bridgman anvils of W-Co alloy (8% Co) with the polished face of 12 mm diameter; the press load of 22 to 25 tons. The reflection parameters:

2θ, deg.	*d*, Å	Intensity, %	Half-width, deg.	Comment
11.501	7.6857	3.2	0.22	
29.305	3.0451	52.0	0.30	
43.742	2.0678	100.0	1.64	Diamond, reflection (111)
47.447	1.9146	14.0	0.48	
48.509	1.8751	4.3	0.32	

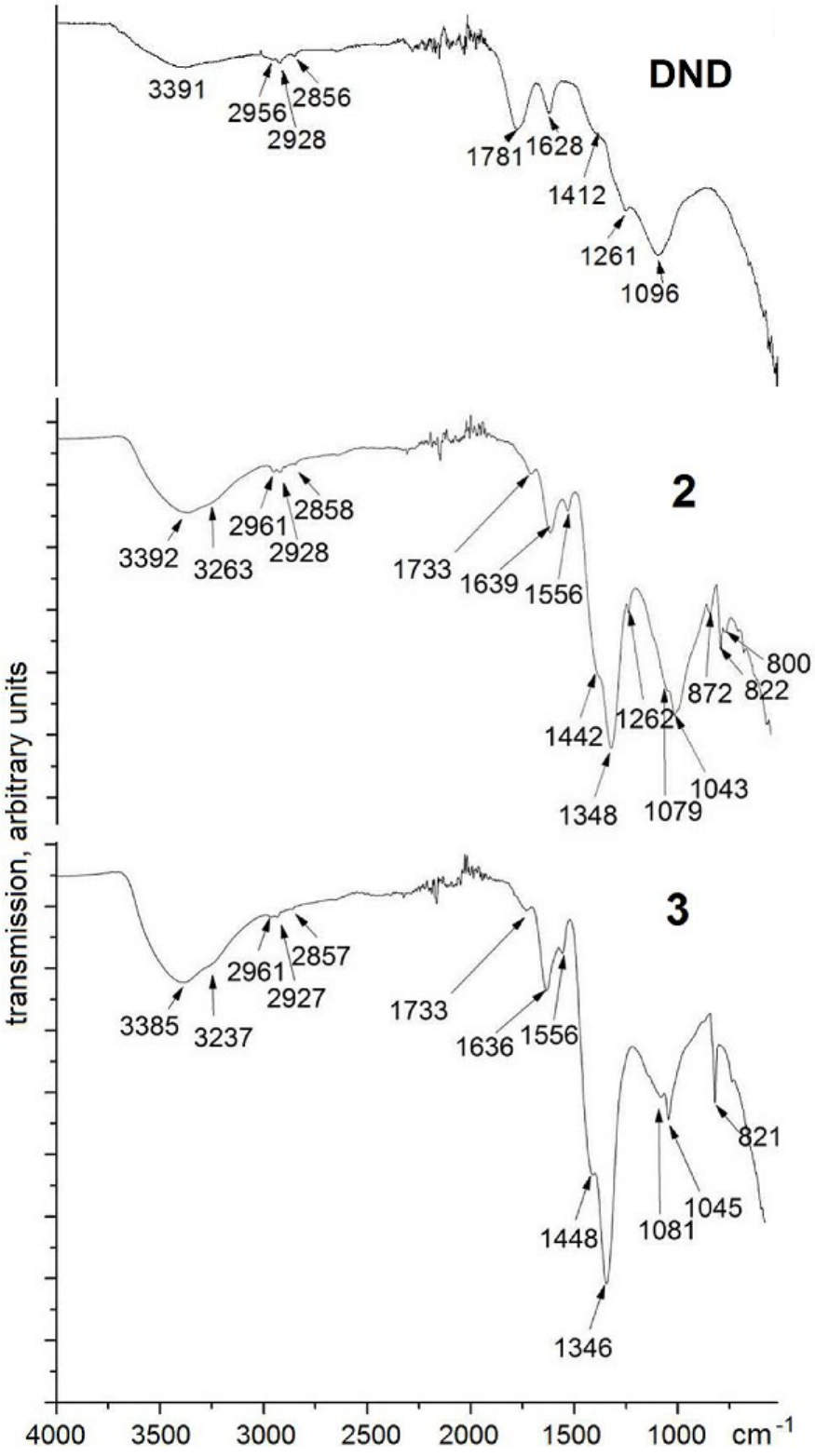

Figure S3. IR spectra of the parent DND and products **2** and **3**

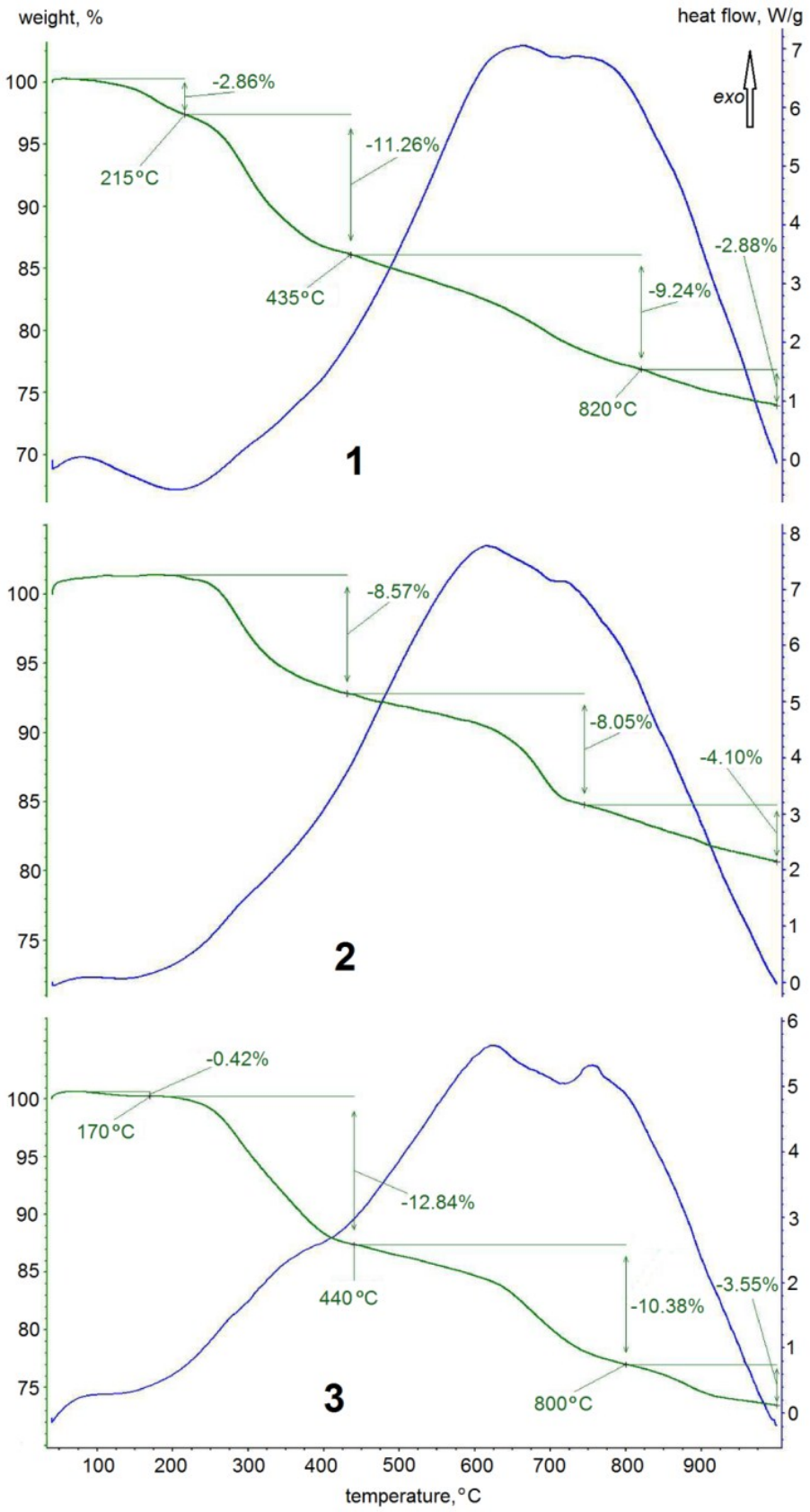

Figure S4. TGA (green, left scale) and DSC curves (blue, right scale) of products **1**, **2** and **3** prepared from DND colloids. Heating in argon, 10 deg/min

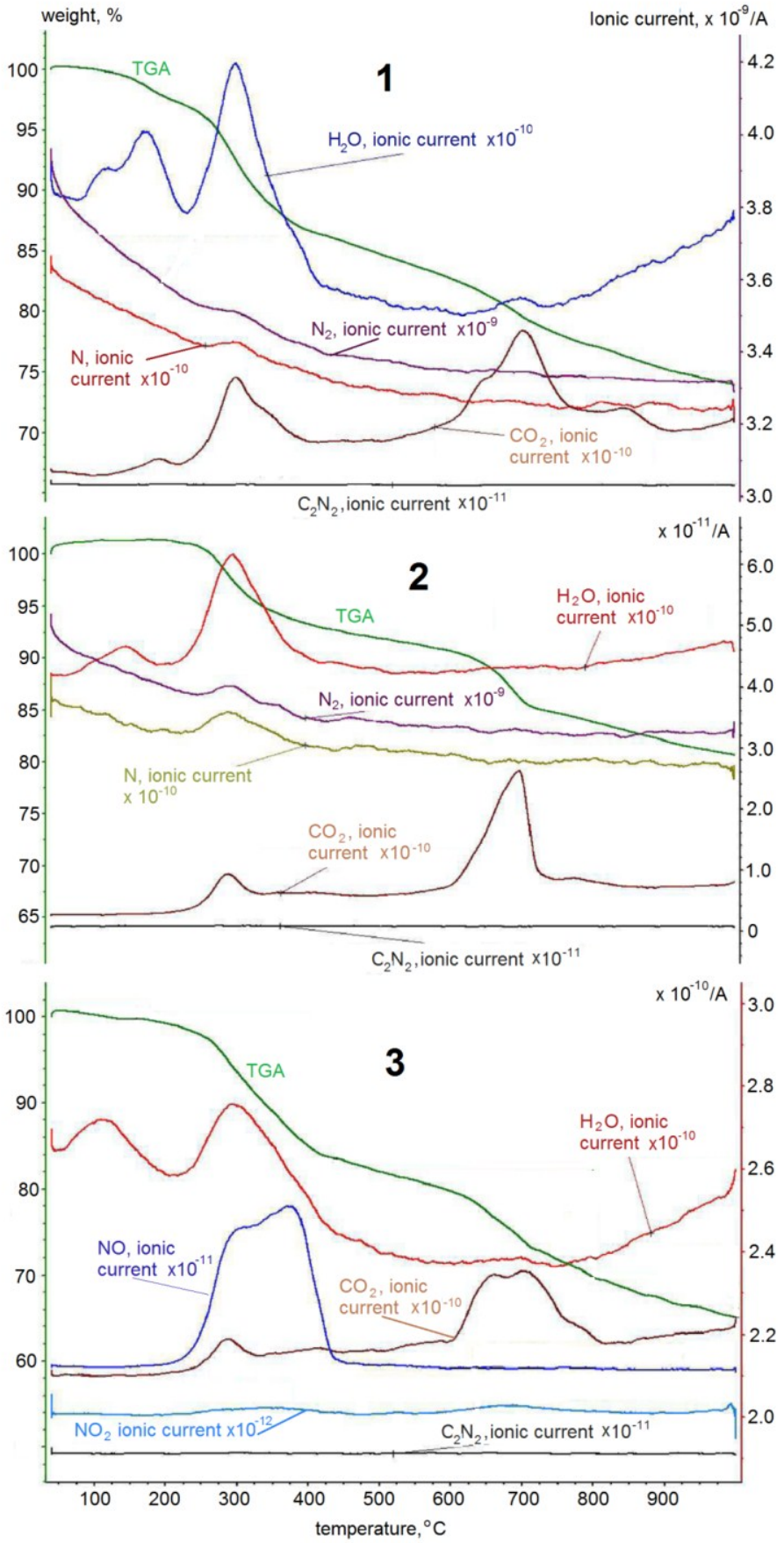

Figure S5. TGA (green, left scale) and mass-spectra of thermal decomposition gases (right scale) of products **1**, **2** and **3** prepared from DND colloids. Heating in argon, 10 deg/min

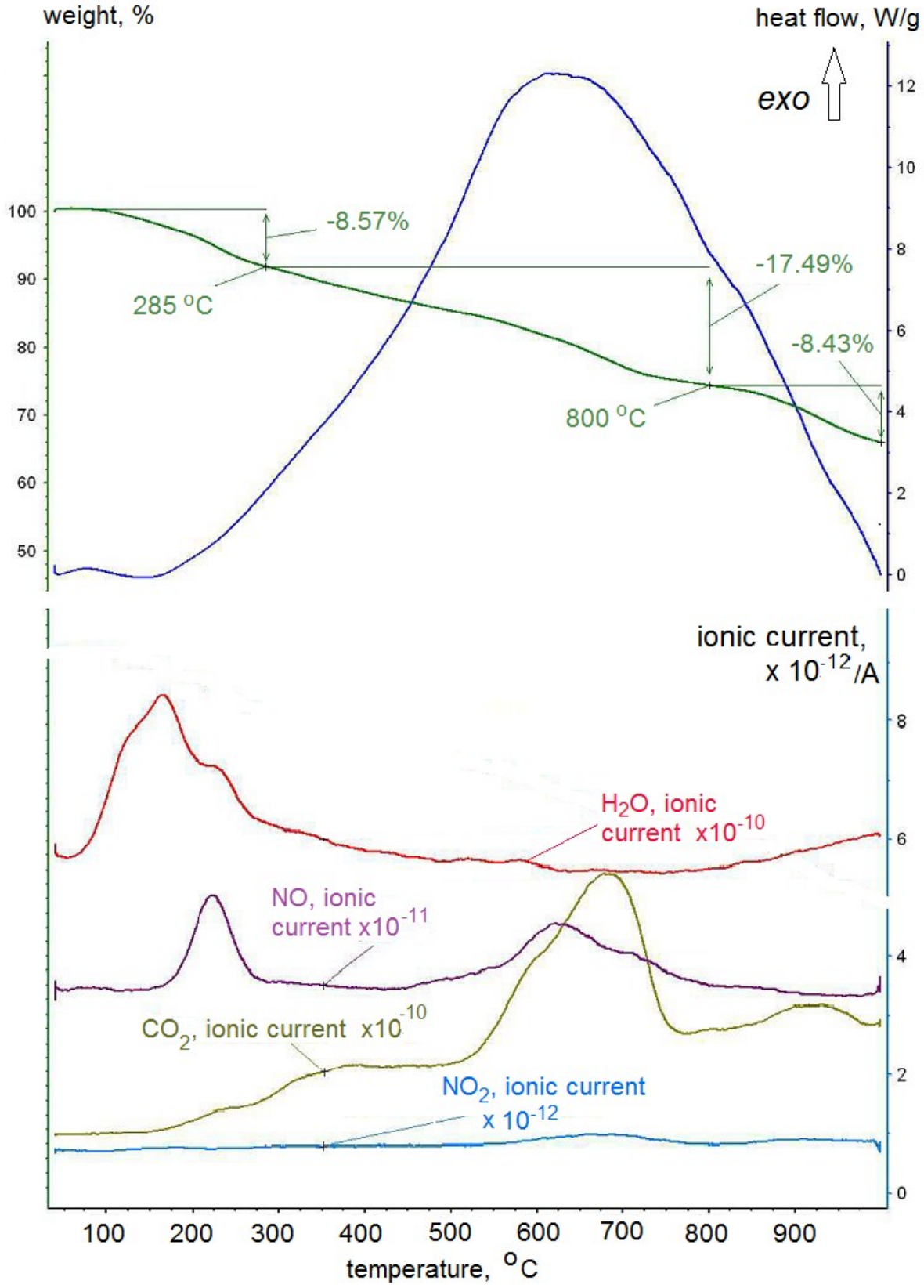

Figure S6. Top: TGA (green, left scale) and DSC (blue, right scale) curves; bottom: mass-spectra of thermal decomposition gases of product **11** prepared from colloids of synthetic diamond. Heating in argon, 10 deg/min

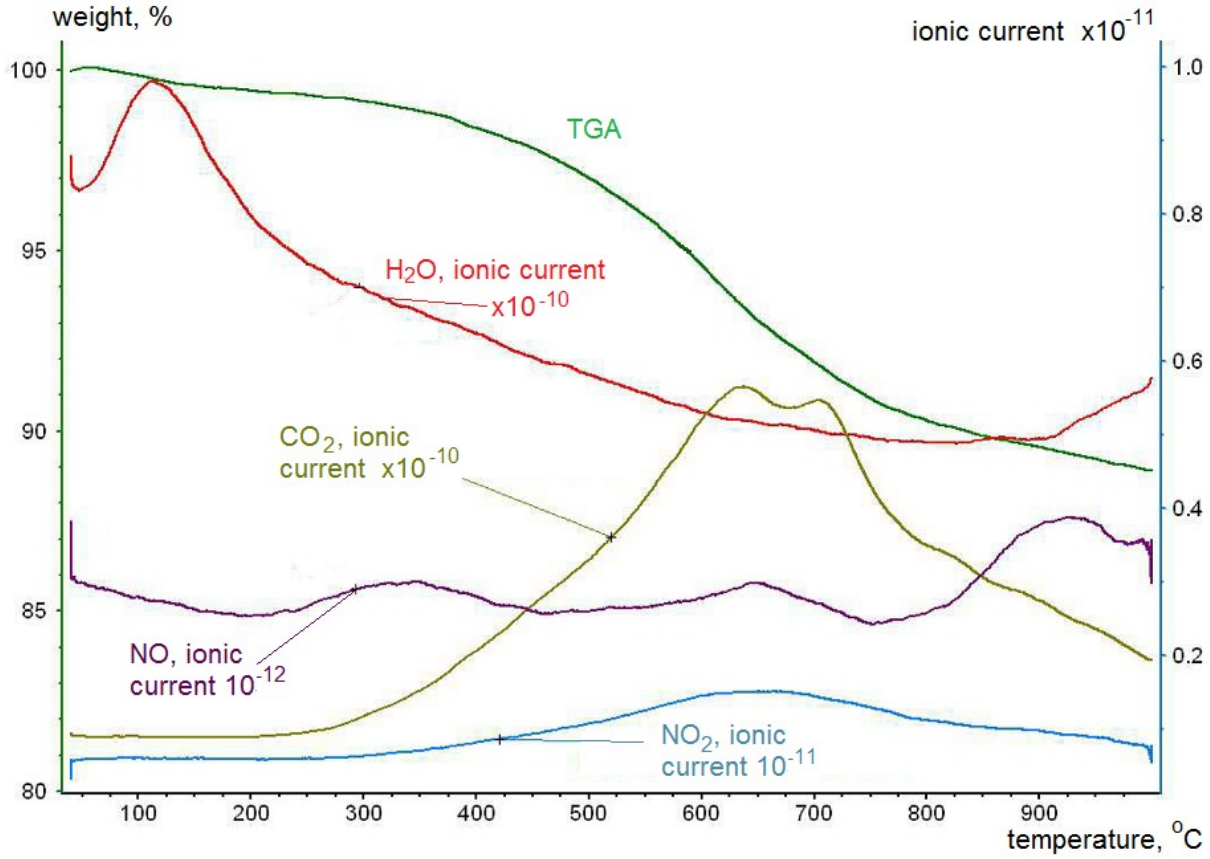

Figure S7. TGA (green, left scale) and mass-spectra of thermal decomposition gases (right scale) of product **7** prepared in the absence of light. Heating in argon, 10 deg/min