

# Variously Prepared Zeolite Y as a Modifier of ANFO

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## The modification of zeolite Y with Mg

### a) impregnation (Mg- $Y_{impr}$ )

6 g of a dry zeolite Na-Y (Inowrocław-Mątwy) was impregnated with a 5.33 g of  $Mg(NO_3)_2 \cdot 6H_2O$  (Sigma-Aldrich, ACS>99%). Afterward, the resulting slurry was dried overnight at 80 °C.

### b) ion-exchange (Mg- $Y_{ion-exch}$ )

A Fivefold  $Na^+/NH_4^+$  ion-exchange procedure of zeolite Y (30 g) was conducted using 500 ml of 0.5 M aqueous magnesium nitrate at 80 °C for 2 h.

### c) ultrasonic-assisted impregnation (Mg- $Y_{son}$ )

In the ultrasonic method, zeolite Y (5g) was immersed in 0.5 M aqueous magnesium nitrate solution (200 ml) and treated with ultrasounds for 30 min using QSonica Q-700 sonicator (Church Hill Rd, Newtown, CT, USA) equipped with a “1/2” diameter horn (the average power of sonication was 60 W and frequency was 20 kHz). During the sonication procedure, the glass tube filled with the zeolite precursor was placed in an ice bath in order to maintain room temperature.

**Final treatment:** Mg-Y zeolites obtained according to procedures denoted as a), b) and c) subjected to a triple centrifugation (4200 RPM for 10 min), drying overnight at 80 °C and the calcination at 500 °C for 4 h in airflow (50 ml/min).

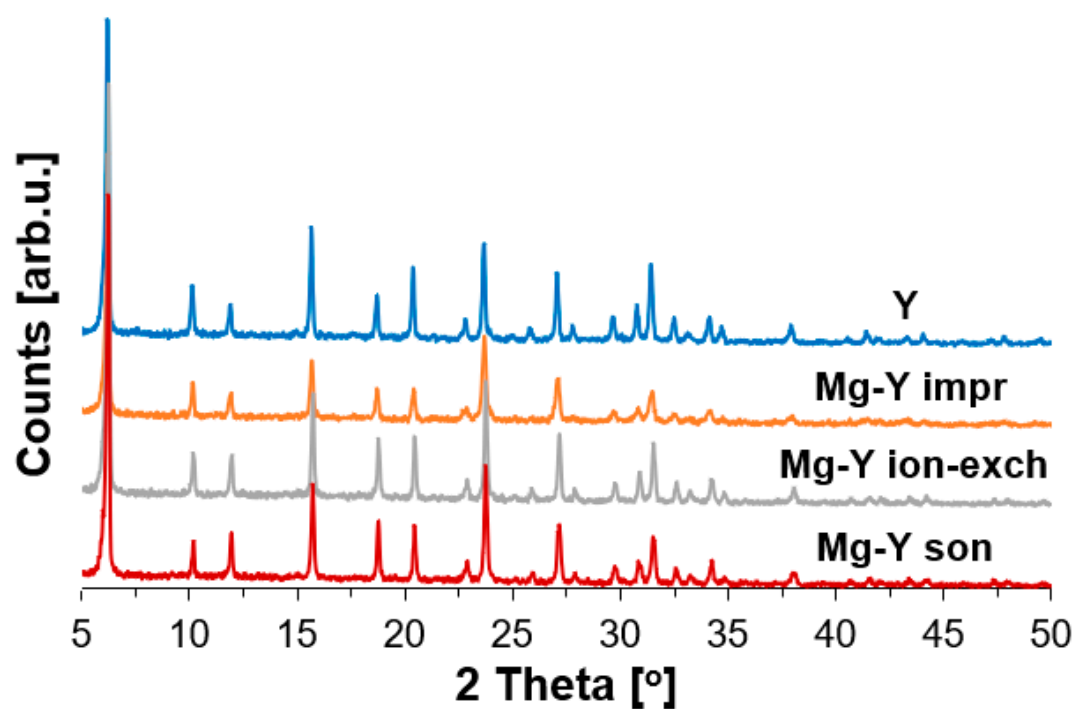


Figure S1. XRD patterns of the variously modified Y-type zeolites.

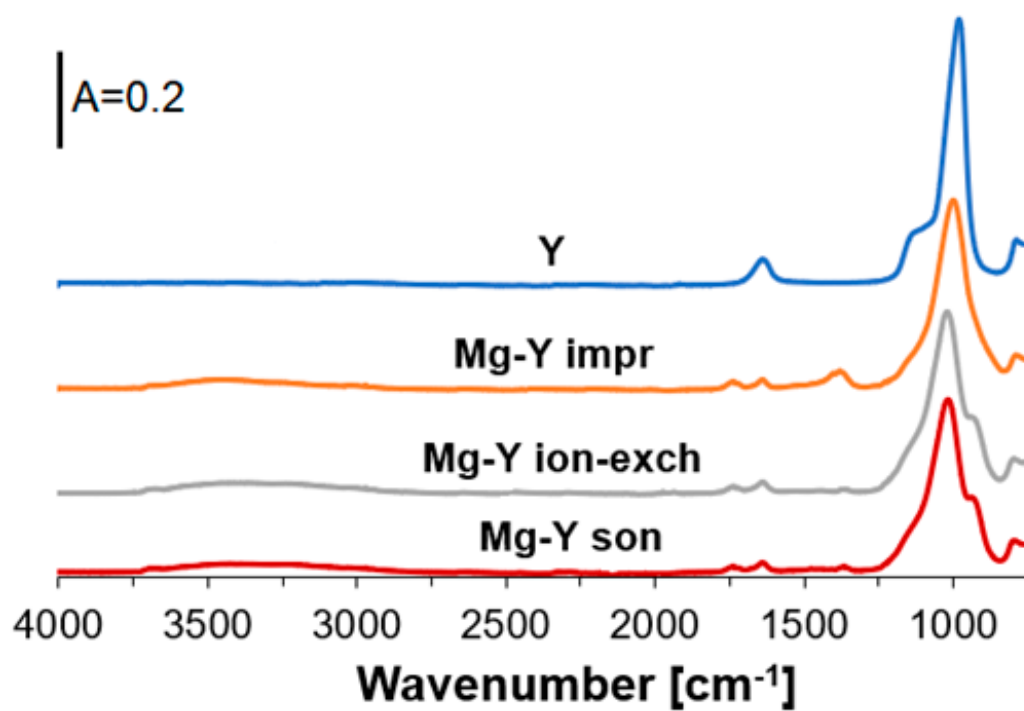


Figure S2. FT-IR spectra of the variously modified Y-type zeolites.

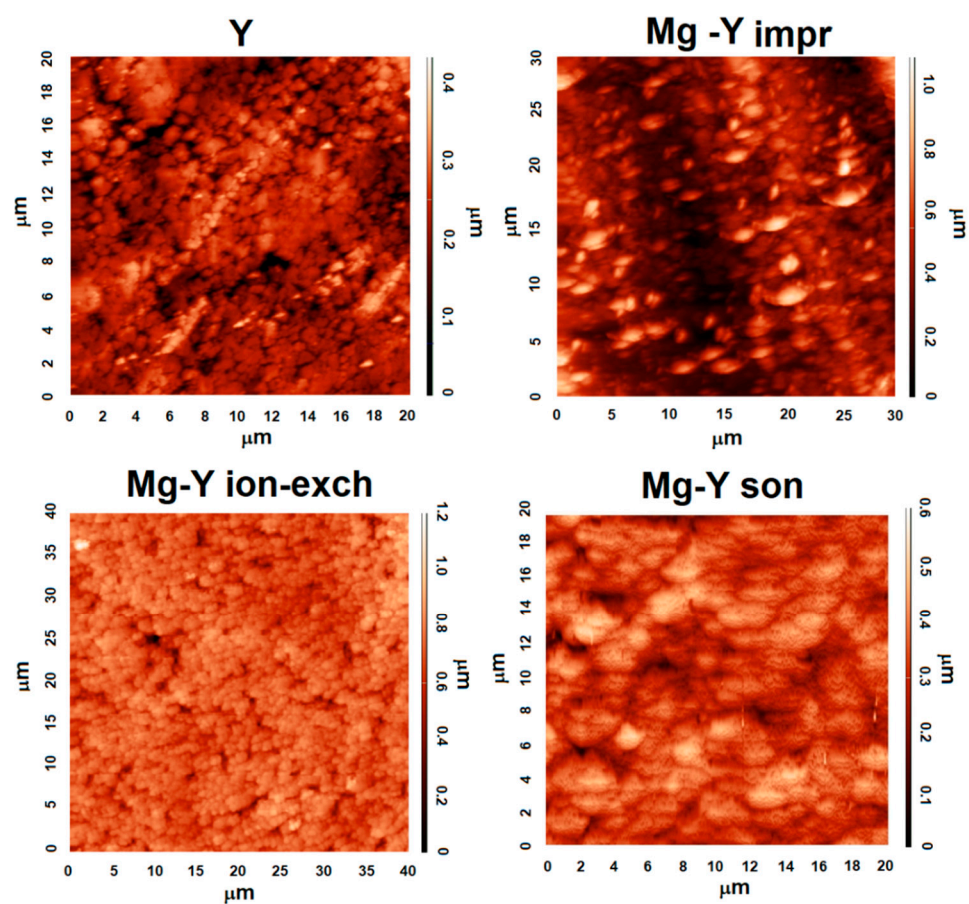


Figure S3. AFM images of the surface of variously modified Y-type zeolites.

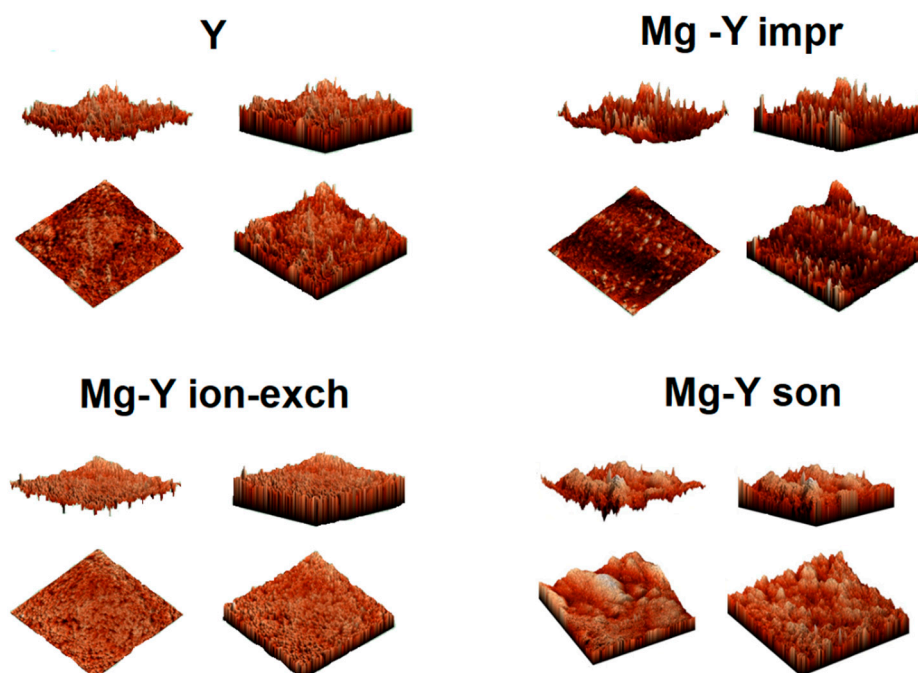


Figure S4. AFM visualization of the surface of variously modified Y-type zeolites in different projections.

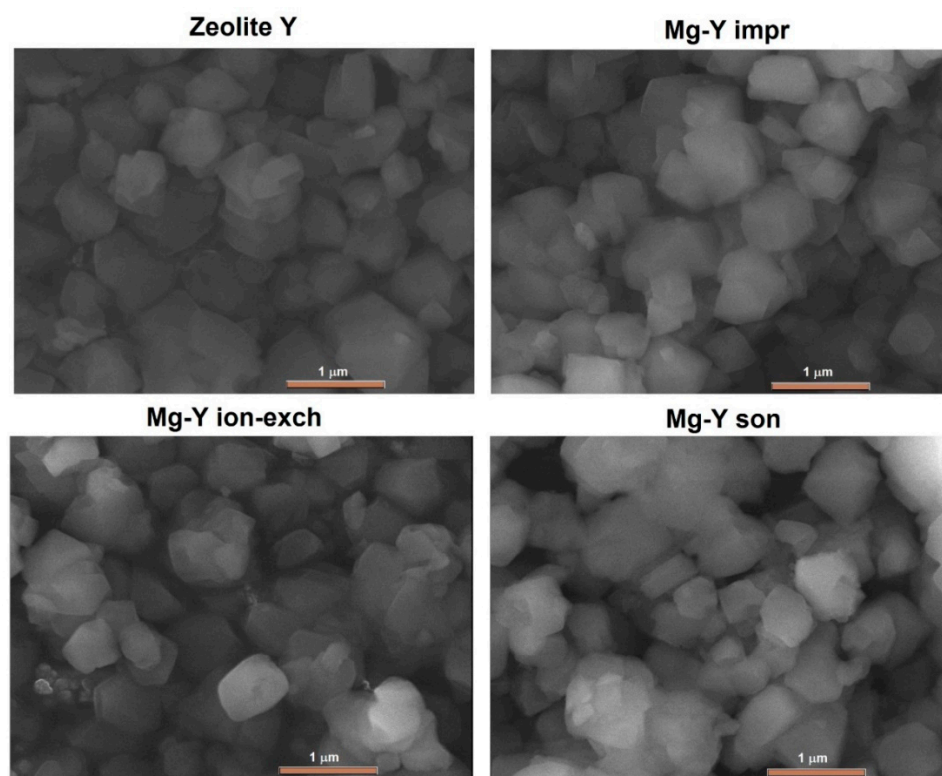


Figure S5. SEM images of variously modified Y-type zeolites.

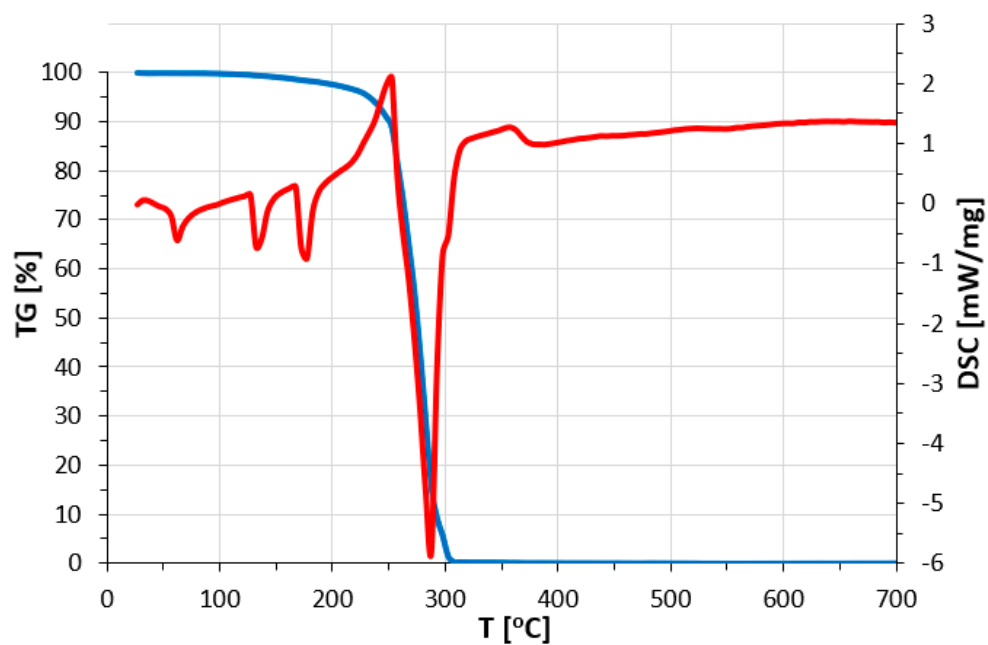


Figure S6. TG/DSC profiles for sample A.

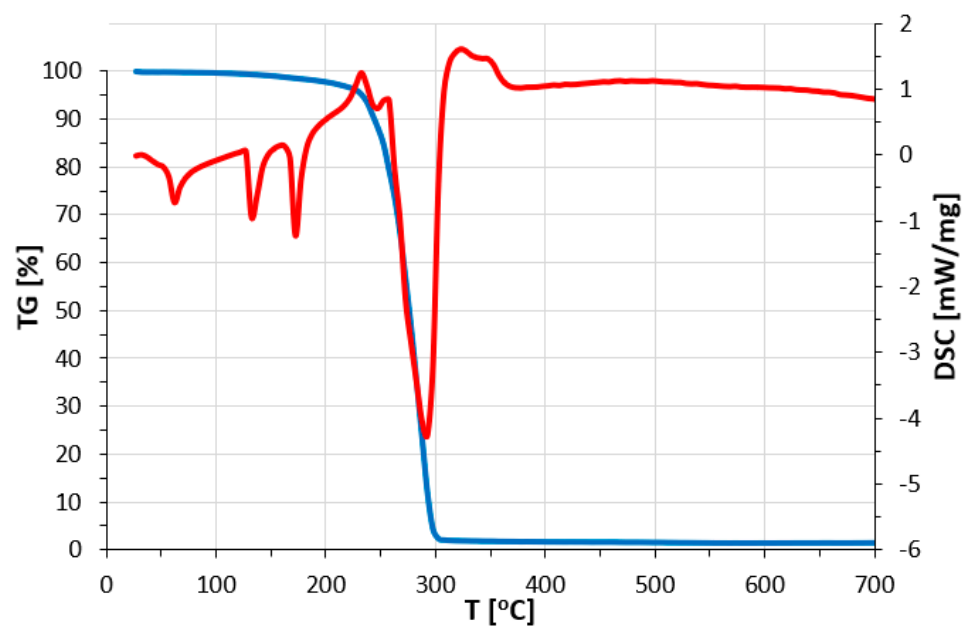


Figure S7. TG/DSC profiles for sample B2.

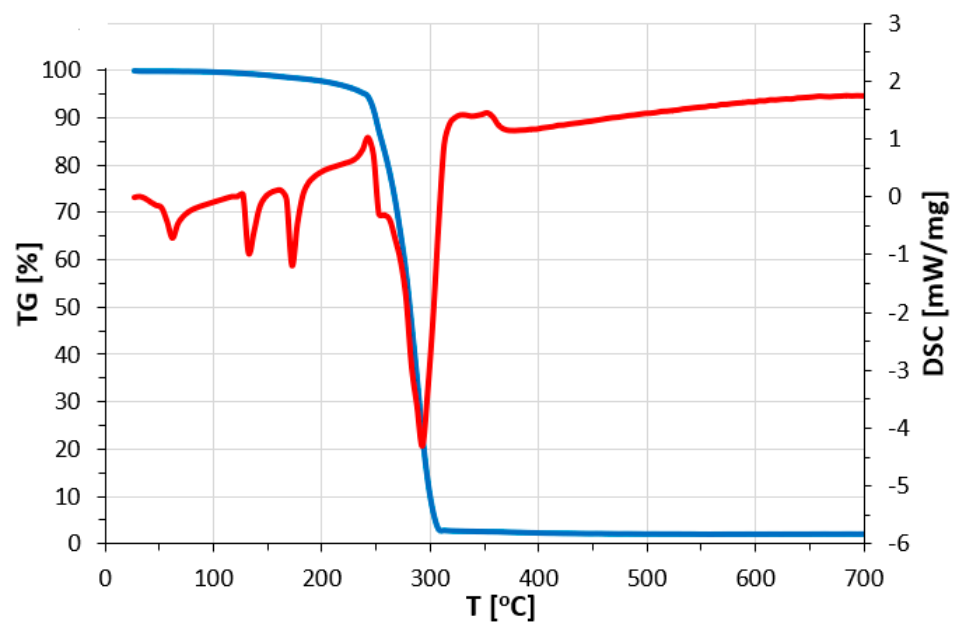


Figure S8. TG/DSC profiles for sample C2.

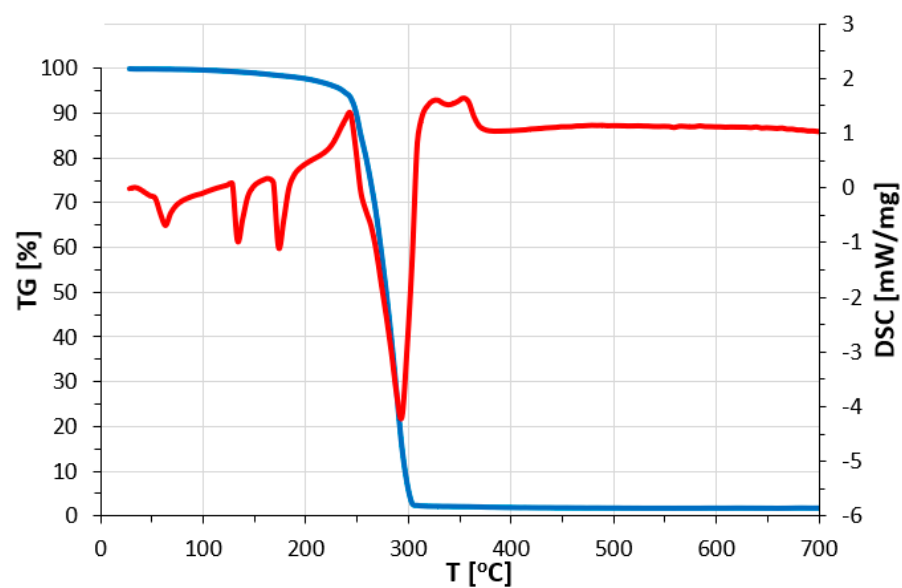


Figure S9. TG/DSC profiles for sample D2.

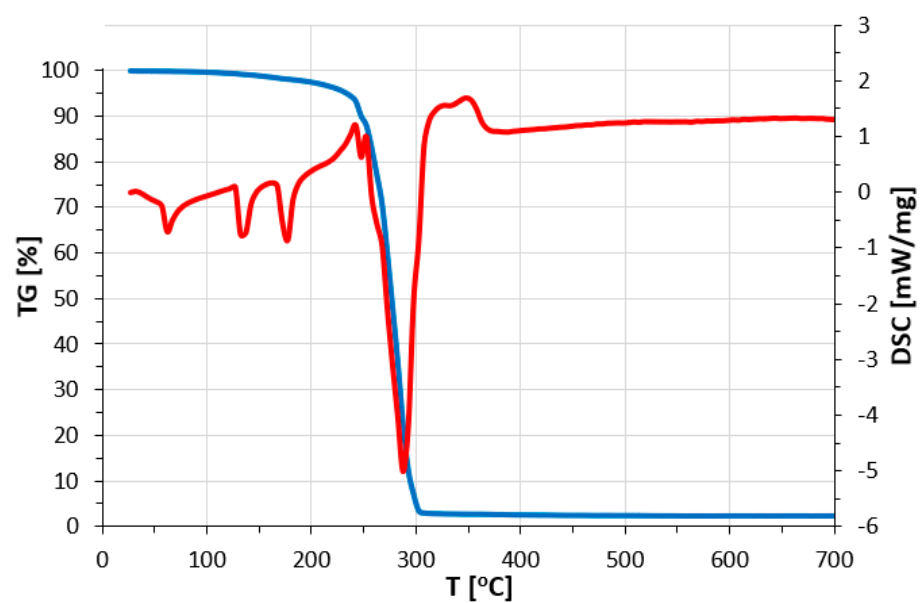


Figure S10. TG/DSC profiles for sample E2.

Table S1. EDS (Energy Dispersive Spectroscopy) chemical analysis of variously modified zeolite Y.

Sample	Chemical analysis (EDS)					
	Si [% wt.]	Al [% wt.]	O [% wt.]	Na [% wt.]	Mg [% wt.]	Mg [% wt.]/ Na [% wt.]
zeolite Y	21.5	7.9	65.6	5.0	0.0	0.0
Mg-Y impr	16.5	5.9	68.2	5.2	4.2	0.81
Mg-Y ion-exch	18.3	8.2	69.0	1.8	2.7	1.50
Mg-Y son	19.4	8.3	65.8	3.4	3.1	0.91