

Analyzing HDPE Thermal and Catalytic Degradation in Hydrogen Atmosphere: A Model-Free Approach to the Activation Energy

Cátia S. Costa ¹, A. Fernandes ¹, Marta Munoz ², M. Rosário Ribeiro ^{1,*} and João M. Silva ^{1,3}

¹ Centro de Química Estrutural, Institute of Molecular Sciences, Departamento de Engenharia Química, Instituto Superior Técnico, Universidade de Lisboa, 1049-001 Lisboa, Portugal; catia.s.costa@tecnico.ulisboa.pt (C.S.C.); auguste.fernandes@tecnico.ulisboa.pt (A.F.); jmsilva@deq.isel.ipl.pt (J.M.S.)

² Departamento de Matemática Aplicada, Ciencia e Ingeniería de los Materiales y Tecnología Electrónica. Universidad Rey Juan Carlos, 28933 Madrid, Spain; marta.munoz@urjc.es

³ Departamento de Engenharia Química, Instituto Superior de Engenharia de Lisboa, Instituto Politécnico de Lisboa, 1959-007 Lisboa, Portugal

* Correspondence: rosario@tecnico.ulisboa.pt

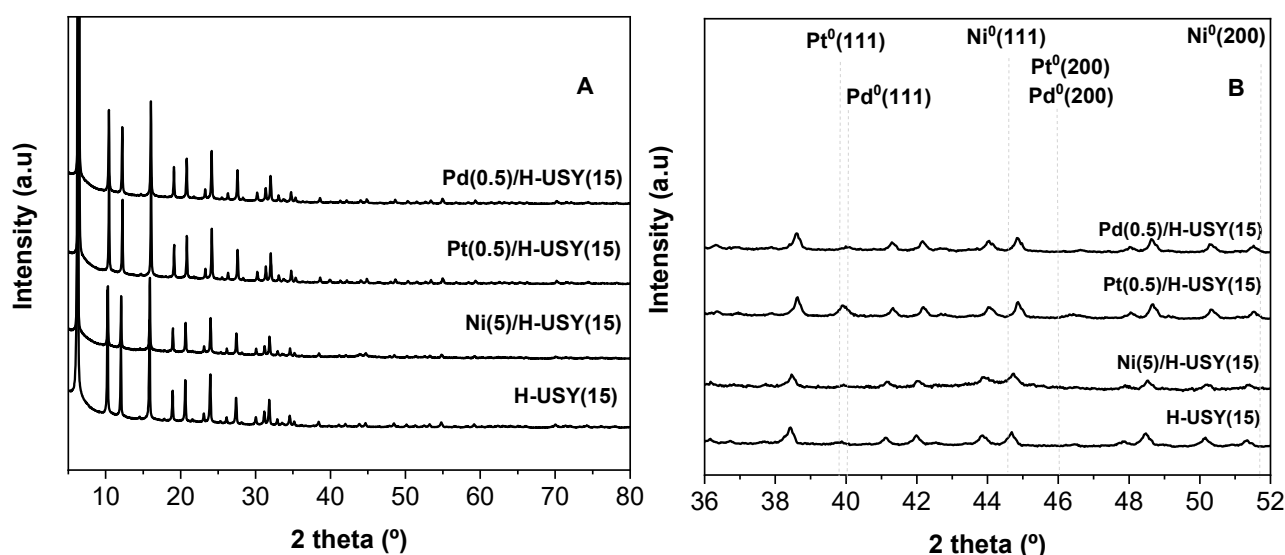


Figure S1. PXRD diffractograms of parent and metal based (Ni, Pt, Pd) H-USY (A) and identification of Ni⁰, Pt⁰ and Pd⁰ species on XRD diffractograms (B).

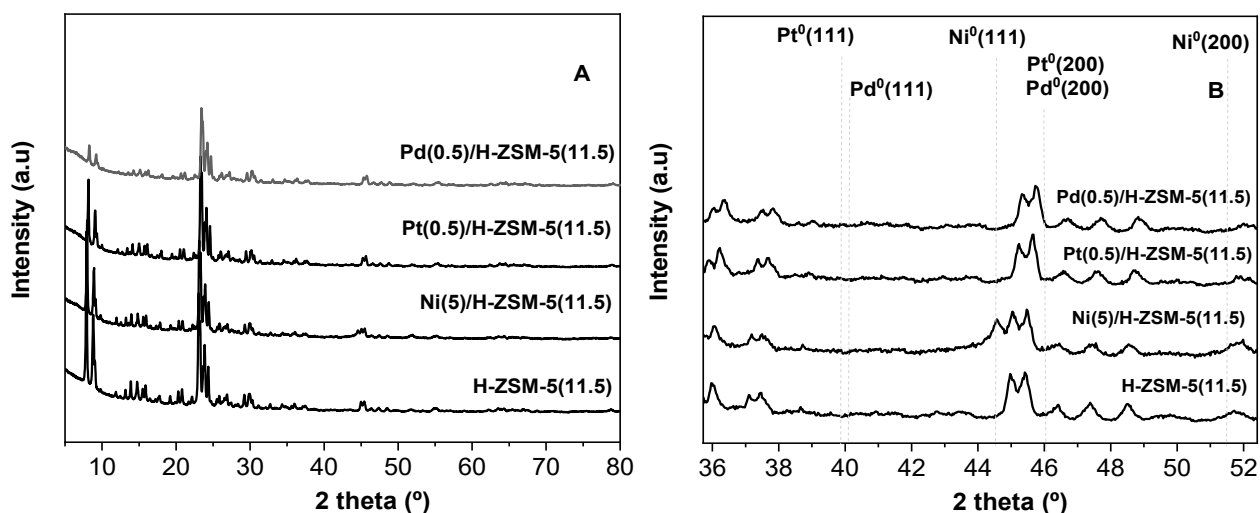


Figure S2. PXRD diffractograms of parent and metal based (Ni, Pt, Pd) H-ZSM-5 (A) and identification of NiO, PtO and PdO species on XRD diffractograms (B).

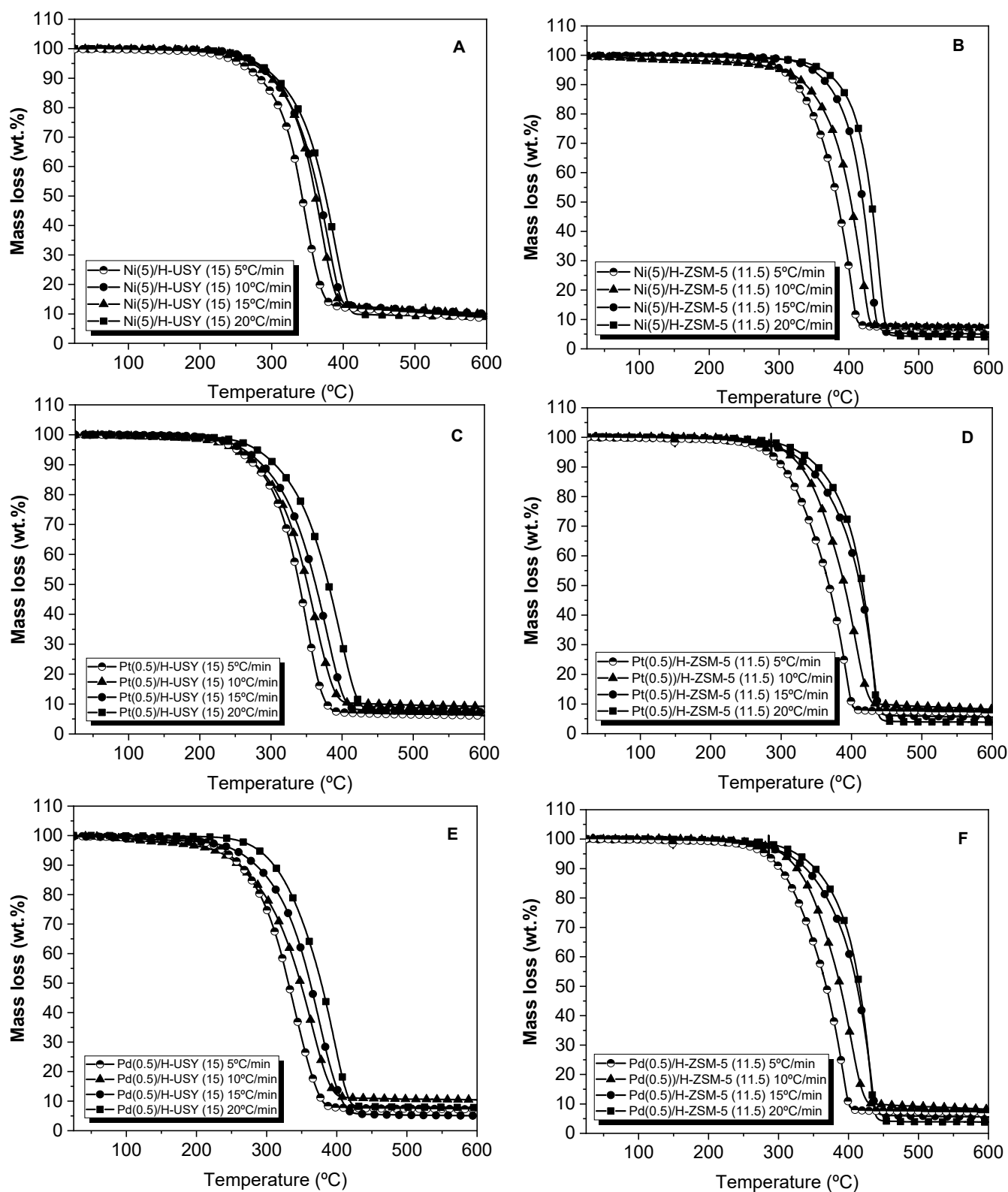


Figure S3. TGA profiles at distinct β (5, 10, 15 and 20 °C/min) for Ni, Pt and Pd based HUSY (A,C,E) and H-ZSM-5 (B,D,F) zeolites.

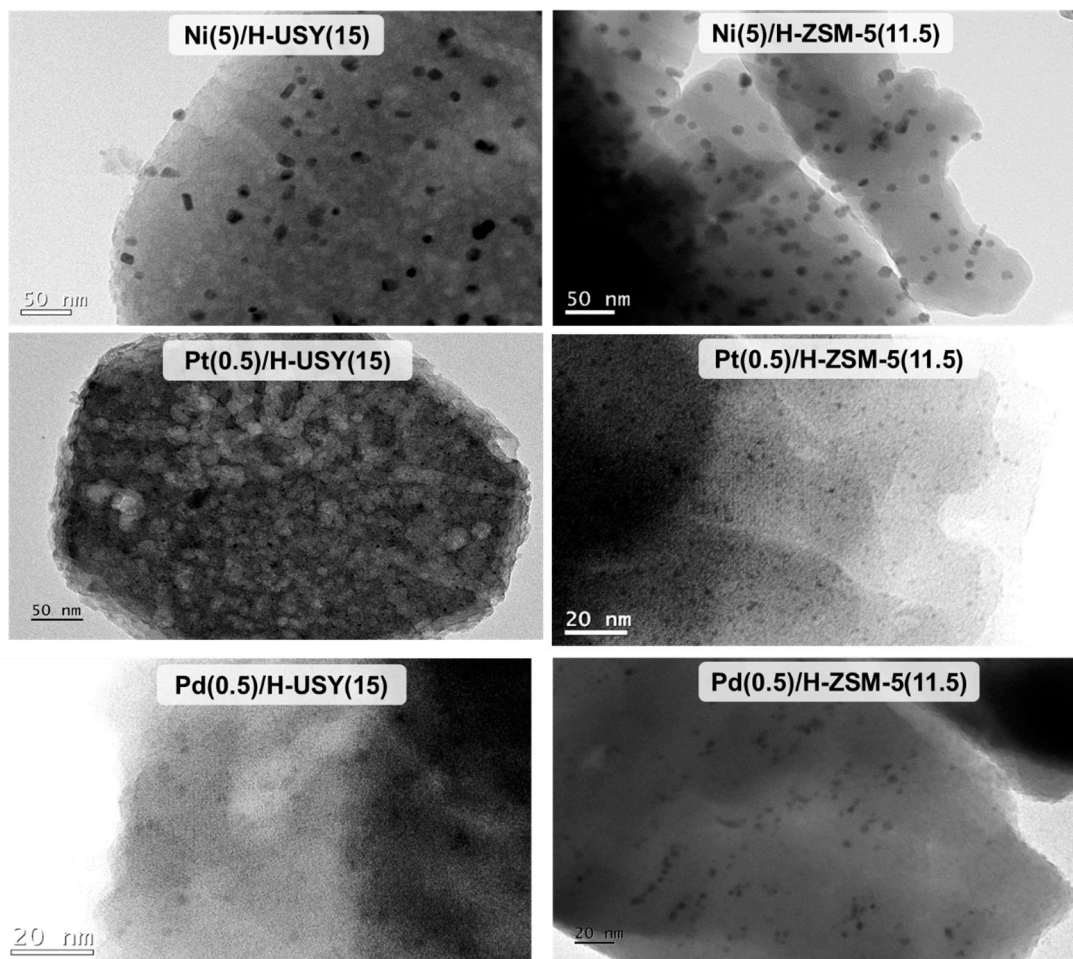


Figure S4. TEM images of Ni, Pt and Pd based H-USY(15) and H-ZSM-5(11.5) zeolites.

Table S1. Metallic properties of metal-based H-USY and H-ZSM-5 zeolites.

Catalyst	Metal content (wt.%)	Metal average size (nm)	Dispersion (%)
Ni/H-USY (15)	4.6	9.50±7	8.7
Pt/H-USY (15)	0.53	1.70±0.6	57.0
Pd/H-USY (15)	0.49	2.10±0.6	44.0
Ni/ H-ZSM-5 (11.5)	4.6	9.2±2.6	9.1
Pt/ H-ZSM-5 (11.5)	0.56	1.20±0.3	70.0
Pd/H-ZSM-5 (11.5)	0.49	2.20±0.7	41.0