

NH₃-selective catalytic reduction of NO_x to N₂ over ceria supported HPW based catalysts: influence of tungsten content

Imane El Arrouji ^{1,3}, Cuirong Chen,³ Jamil Toyir ², Cherif Larabi ³, Kai C. Szeto ³, Aimery de Mallmann ³, Mostafa Taoufik ^{3,*} and Abdallah Oulmekki ^{1*}

¹ Laboratory of Processes, Materials and Environment (LPME), Faculty of Science and Technology Fez, University Sidi Mohammed Ben Abdellah, BP. 2202 Morocco; imane.elarrouji@usmba.ac.ma; abdallah.oulmekki@usmba.ac.ma

² Laboratory of Processes, Materials and Environment (LPME), University Sidi Mohammed Ben Abdellah, Faculty Polydisciplinary of Taza, B.P 1223, Taza, Morocco; jamil.toyir@usmba.ac.ma

³ Université Lyon 1, Institut de Chimie Lyon, CPE Lyon CNRS, UMR 5265 C2P2, LCOMS, 43 Bd du 11 Novembre 1918, 69616 Villeurbanne Cedex, France; cherif.larabi@univ-lyon1.fr; kai-chung.szeto@univ-lyon1.fr; aimery.de-mallmann@univ-lyon1.fr; mostafa.taoufik@univ-lyon1.fr.

* Correspondence: mostafa.taoufik@univ-lyon1.fr; abdallah.oulmekki@usmba.ac.ma

Figure S1: N₂ physisorption isotherms for each catalyst.

Figure S2: IR spectra of ceria and HPW.

Figure S3: Enlarged image of Ce-O symmetry at 500-700 cm⁻¹ (Raman spectra)

Figure S4: deconvolutions of Raman spectra for each catalyst in the range 300-650 cm⁻¹.

Table S1. Oxygen vacancies values of HPW/CeO₂ (2, 4.5, 9, 16 and 40 wt% W) catalysts.

Figure S5. deconvolutions of Raman spectra for each catalyst in the range 800-1050 cm⁻¹,

Figure S6. NO_x conversion, over HPW as a function of temperature. Feed composition: 300 ppm NO, 350 ppm NH₃, 5 vol. % H₂O and 10 vol. % O₂ in He.

Figure S7: Determination the acidity of 2%HPW/CeO₂ by NH₃ desorption.

Figure S8: NO_x conversion, N₂ selectivity over 2%HPW/CeO₂ as a function of temperature during several cycles. Feed composition: 300 ppm NO, 350 ppm NH₃, 5 vol. % H₂O and 10 vol. % O₂ in He.

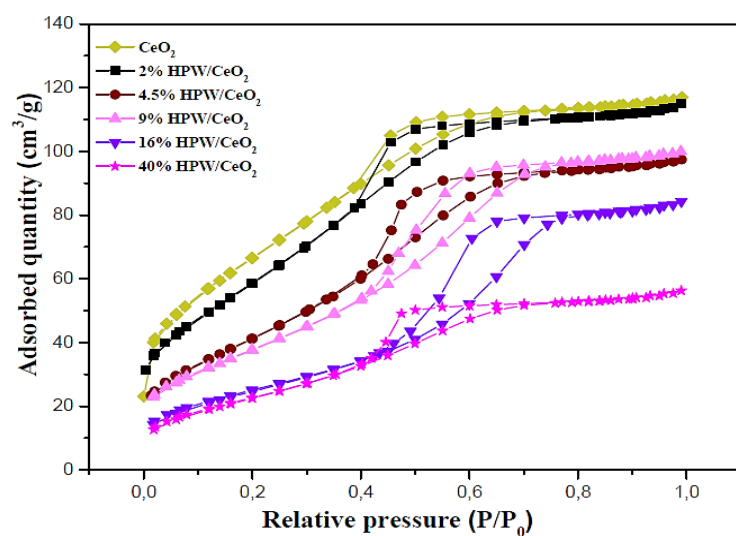


Figure S1. N₂ physisorption isotherms for each catalyst

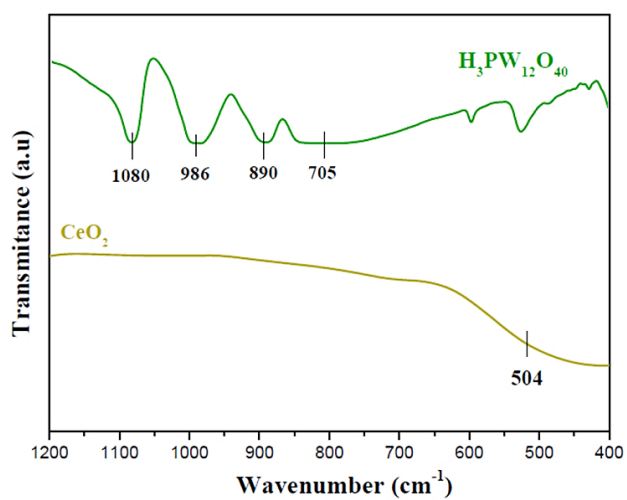


Figure S2. IR-FT spectra of CeO₂ and HPW

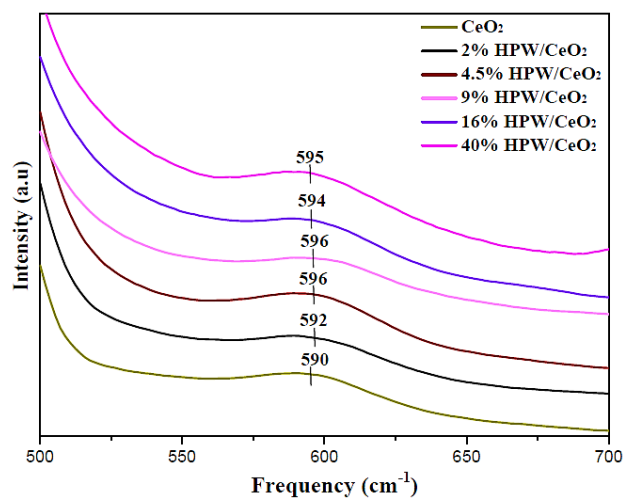


Figure S3. Enlarged image of Ce-O symmetry at 500-700 cm^{-1} (Raman spectra)

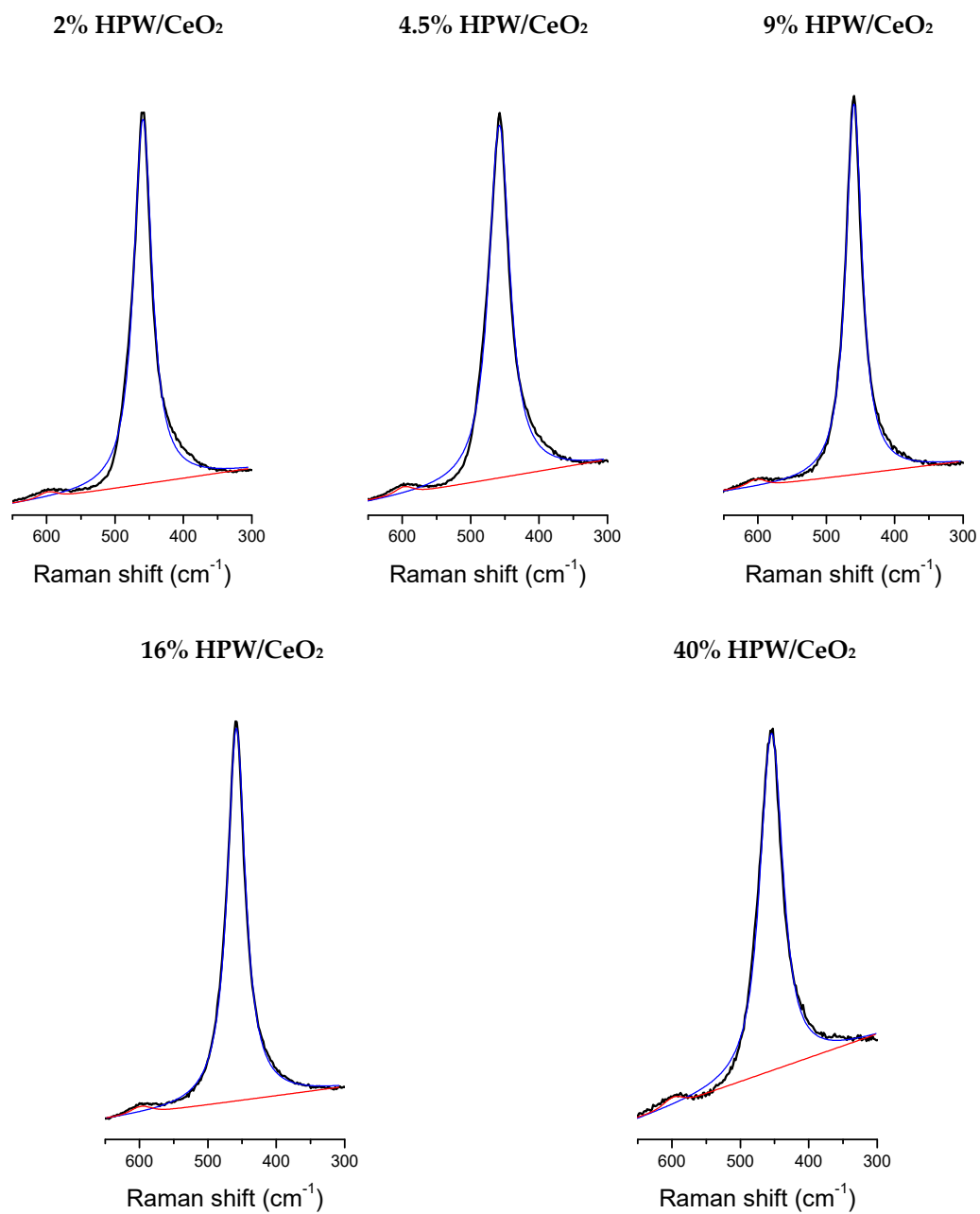


Figure S4. Deconvolutions of Raman spectra for each catalyst in the range 300-650 cm^{-1}

Table S1. Oxygen vacancies values of HPW/CeO₂ (2, 4.5, 9, 16 and 40 wt% W) catalysts.

Catalysts	Oxygen vacancies ($I_{ov}/I_{F_{2g}}$)
2% HPW/CeO ₂	0.016
4.5% HPW/CeO ₂	0.022
9% HPW/CeO ₂	0.021
16% HPW/CeO ₂	0.018
40% HPW/CeO ₂	0.025

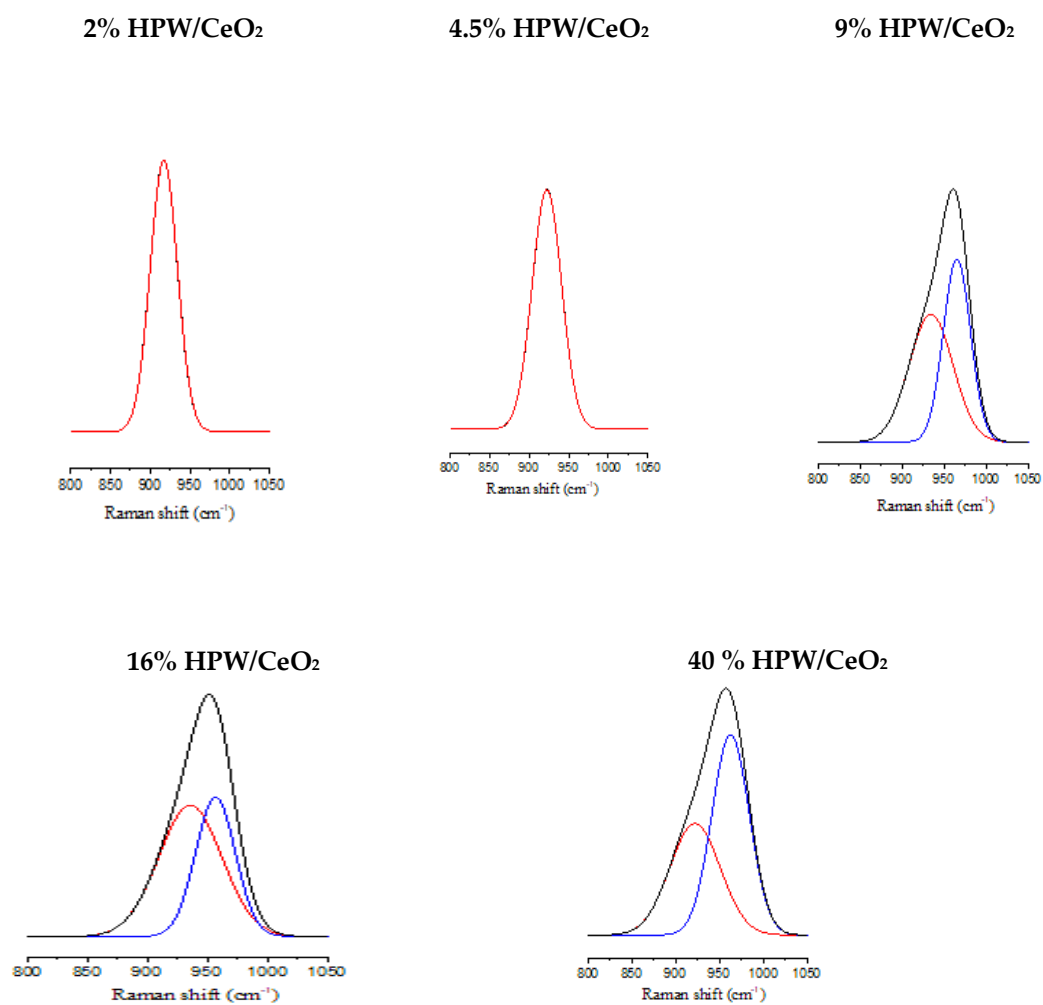


Figure S5. Deconvolutions of Raman spectra for each catalyst in the range 800-1050 cm⁻¹

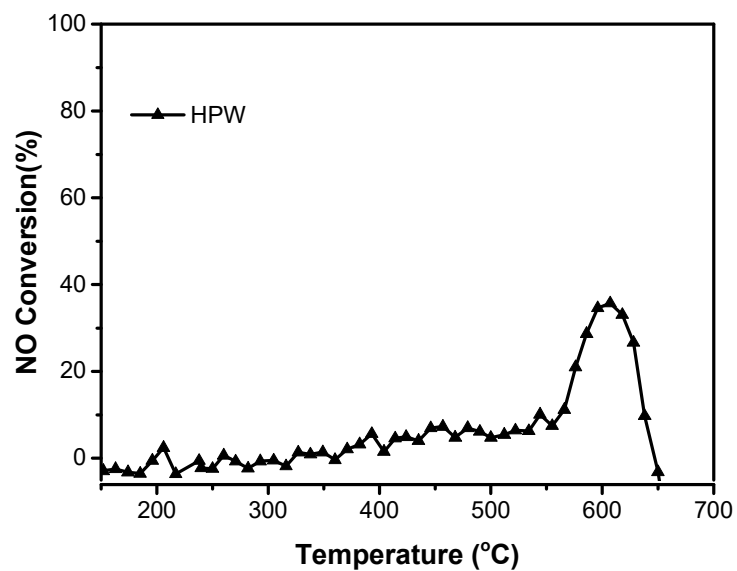


Figure S6: NO_x conversion, over HPW as a function of temperature. Feed composition: 300 ppm NO, 350 ppm NH₃, 5 vol. % H₂O and 10 vol. % O₂ in He.

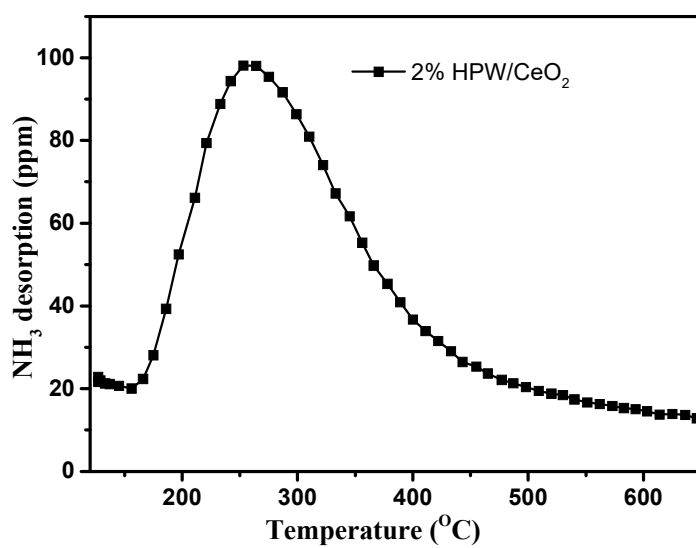


Figure S7. Determination of the acidity of the catalysts 2%HPW/CeO₂ by NH₃ desorption.

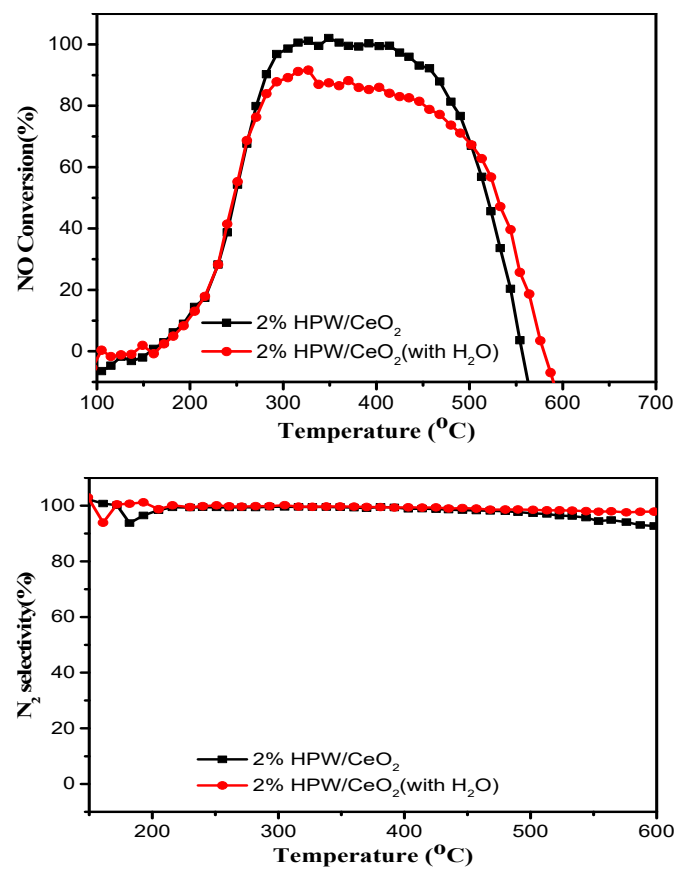


Figure S8. NO_x conversion. N₂ selectivity over 2%HPW/CeO₂ as a function of temperature during several cycles. Feed composition: 300 ppm NO, 350 ppm NH₃, 5 vol. % H₂O and 10 vol. % O₂ in He.