

Supporting Information

Oxidized Palladium Supported on Ceria Nanorods for Catalytic Aerobic Oxidation of Benzyl Alcohol to Benzaldehyde in Protic Solvents

Seyed Sepehr Moeini ^{1,*}, Chiara Battocchio ¹, Stefano Casciardi ², Igor Luisetto ^{3,*}, Paolo Lupattelli ⁴, Daniela Tofani ¹ and Simonetta Tuti ¹

¹ Department of Science, “Roma Tre” University, Rome 00146, Italy; chiara.battocchio@uniroma3.it (C.B.); daniela.tofani@uniroma3.it (D.T.); simonetta.tuti@uniroma3.it (S.T.)

² Department of Occupational and Environmental Medicine, Epidemiology and Hygiene, INAIL Research, Monte Porzio Catone, 00078 Rome, Italy; s.casciardi@inail.it

³ Department of Energy Technologies, Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), 00123 Rome, Italy

⁴ Department of Science, University of Basilicata, Potenza 85100, Italy; paolo.lupattelli@unibas.it

* Correspondence: seyedsepehr.moeini@uniroma3.it (S.S.M.); igor.luisetto@enea.it (I.L.)

XPS analysis of used PdO_x/CeO₂-NR

XPS measurements of used PdO_x/CeO₂-NR was performed measuring the core level spectra, using a VG Escalab MKII, equipped with a twin anode Al/Mg X-ray source (IPSE Laboratory of DTE, ENEA Casaccia, Rome, Italy). The used catalyst was previously tested in BnOH oxidation for 5 hours (conditions: 0.16 mmol BnOH, 32 mg catalyst, 20 ml/min air flow, using ethanol as solvent at boiling point, under reflux). After the reaction, the catalyst was separated by centrifuge (10000 rpm, 20 min), washed 3 times with ethanol, and dried at room temperature. The fresh PdO_x/CeO₂-NR was also studied using abovementioned XPS facility. The calculated PdO and PdO_x percentages for fresh PdO_x/CeO₂-NR (Table S1), is comparable with those reported in Table 2.

Table S1. Binding Energy, Full Width Half Maximum and atomic percent values of Pd3d5/2 components for the fresh and used PdO_x/CeO₂-NR samples.

Sample	BE (eV)	FWHM (eV)	Assignment	Atomic %
PdO _x /CeO ₂ -NR	335.79	2.51	PdO	20.1
	337.76	2.51	PdO _x (x>1)	79.9
Used PdO _x /CeO ₂ -NR	335.82	2.57	PdO	42.7
	337.77	2.57	PdO _x (x>1)	57.3

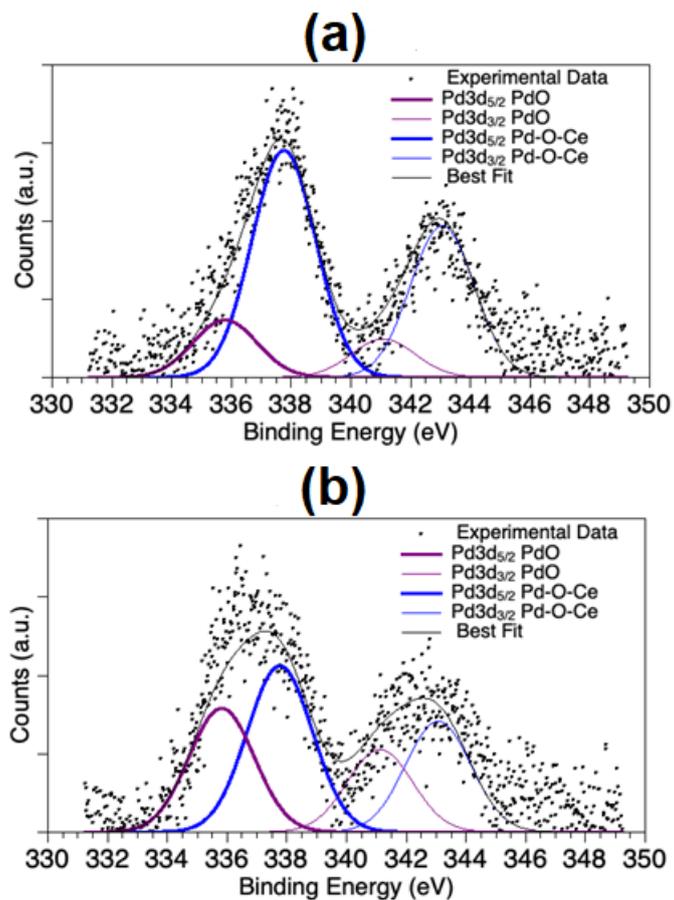


Figure S1. XPS spectra of Pd 3d region for (a) fresh PdO_x/CeO₂-NR, and (b) used PdO_x/CeO₂-NR. BnOH oxidation conditions: 0.16 mmol BnOH, 32 mg catalyst, 20 ml/min air flow, using ethanol as solvent at boiling point, under reflux.