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Supplementary Information

High selectivity PdZn/ZnO catalysts for methanol steam reforming reaction

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Figure S1. Equilibrium calculations relating to the methanol steam reforming reaction: a) temperature dependence of methanol conversion and CO_2 selectivity at equilibrium; b) temperature dependence of relative abundances of gases in the equilibrium state when methanol steam reforming, methanol decomposition and water gas shift were taken into account. (p = 1 bar; MeOH: H_2O ratio 1:1) [1].

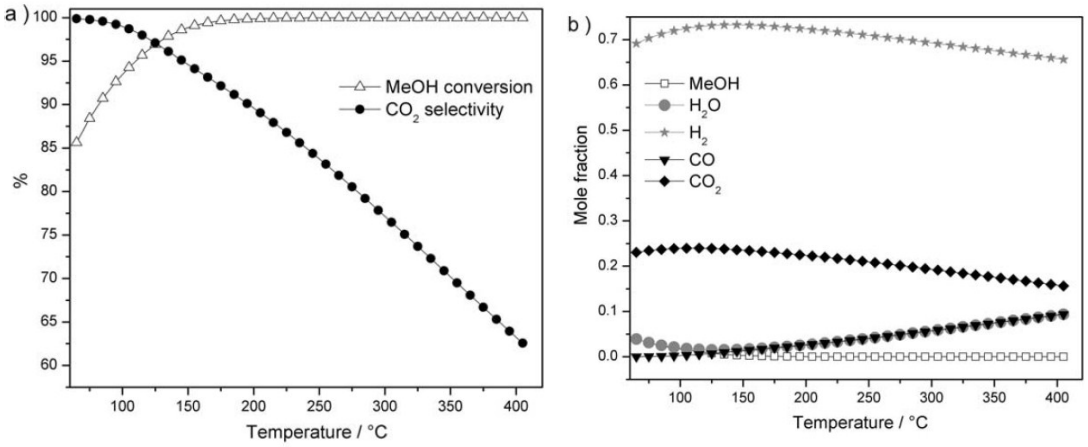


Figure S2. Powder XRD analysis of the bare ZnO_{nano} support after treatment with HCl. *Legend:* Reflections from $Zn_5Cl_2H_{10}O_9$ (●) and ZnO (Δ).

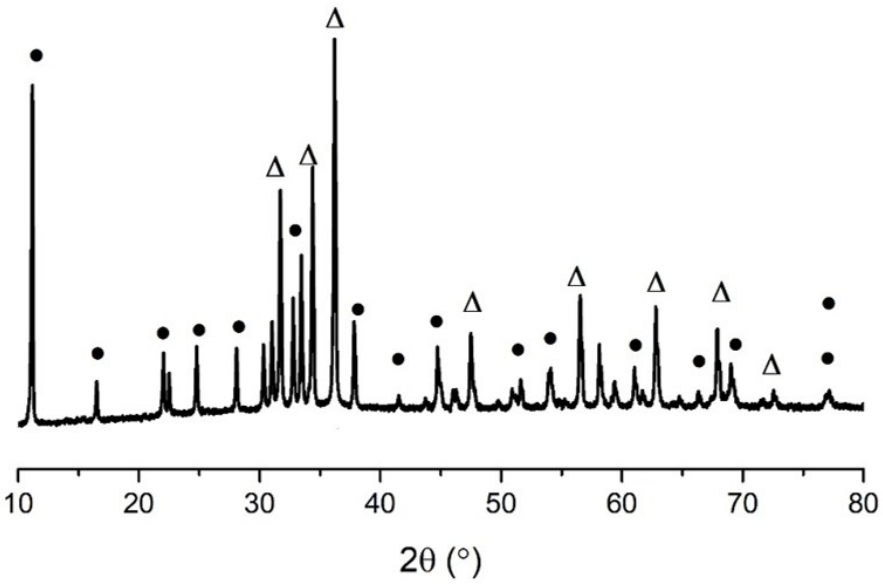


Figure S3. Pd(3d) XPS spectrum obtained from the fresh M_{Imp} derived 3wt%PdZn/ZnO_{nano} sample. The Pd($3d_{5/2}$) peak is found to be centered at 337.4 eV and taken together with the peak shape, is consistent with the presence of Pd-Cl species as shown in Figure S4.

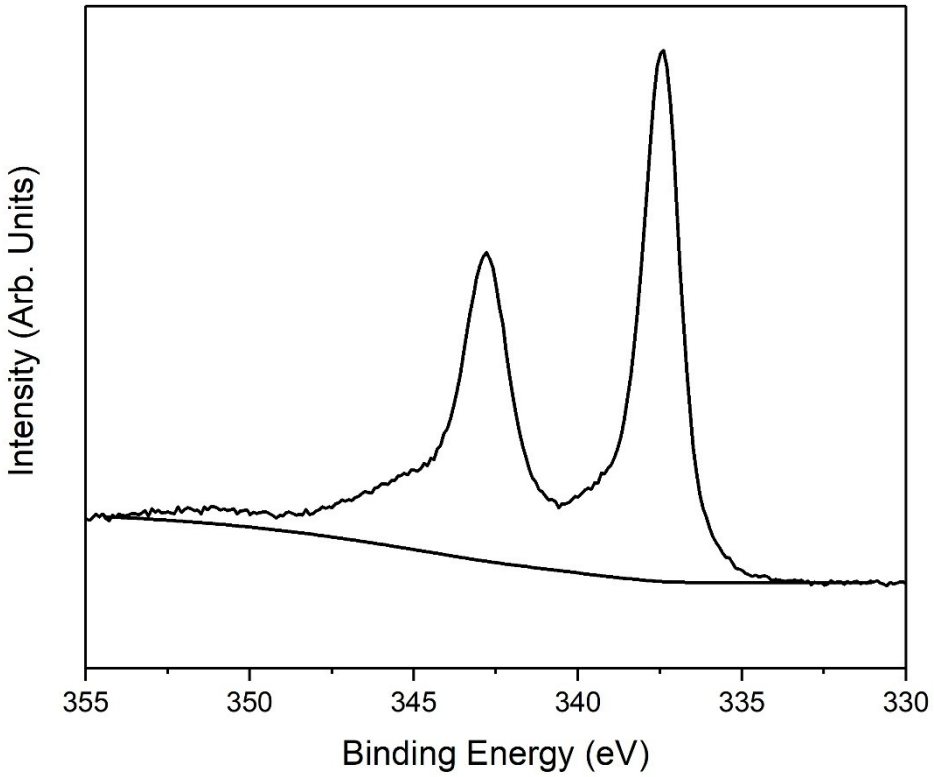


Figure S4. Pd(3d) XPS spectra obtained from a bulk $PdCl_2$ reference sample. The Pd($3d_{5/2}$) binding energy is 337.5 eV and the Cl/Pd ratio found to be 1.92 which is close to the expected stoichiometry.

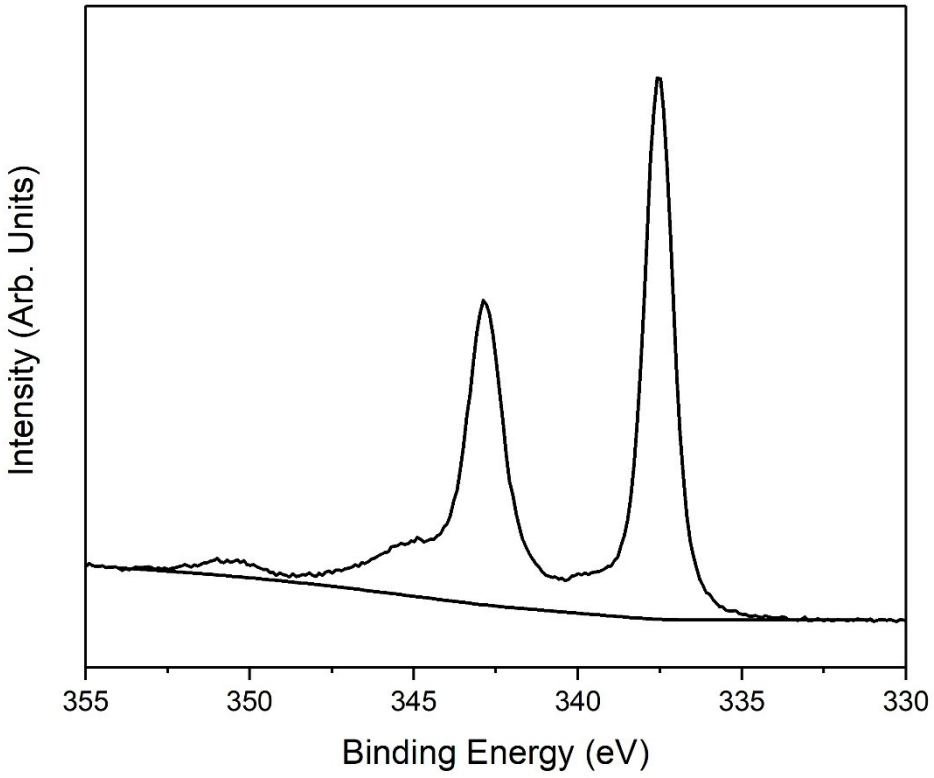


Figure S5. STEM-XEDS elemental maps of the unused M_{Imp} 3%PdZn/ZnO catalyst showing the elemental distribution of Pd, Cl, Zn and O. The Cl signal is at the noise level (1-3 counts).

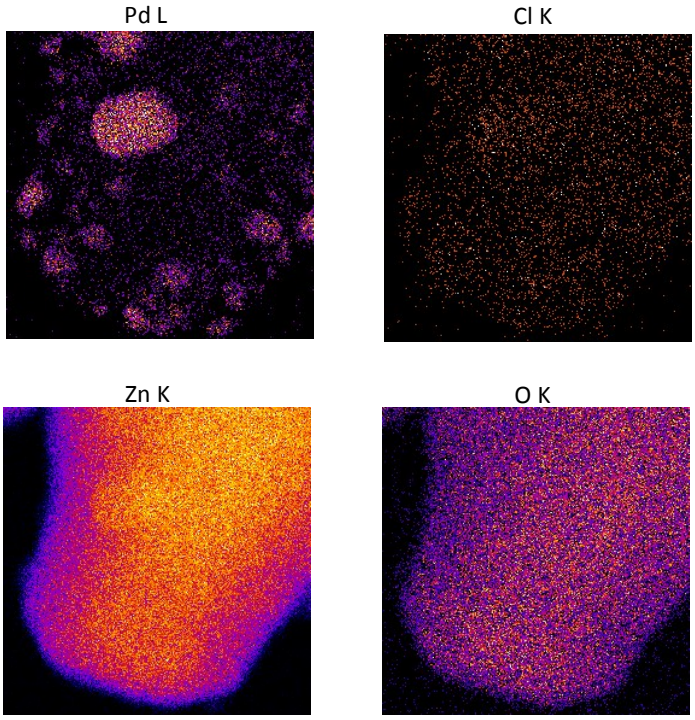
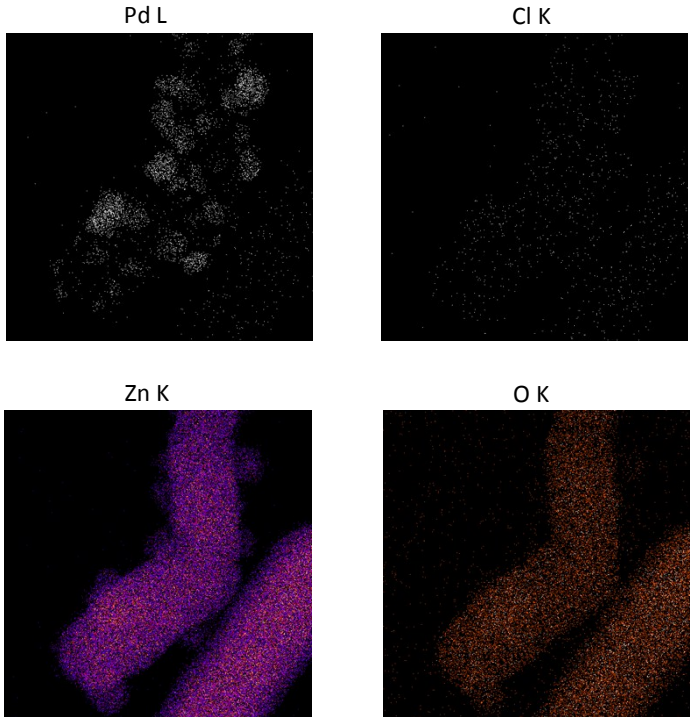


Figure S6. STEM-XEDS elemental maps of the unused C_{Imp} 3%PdZn/ZnO catalyst showing the elemental distribution of Pd, Cl, Zn and O. The Cl signal is at the noise level (1-3 counts).



Reference:

[1] Y. Luo, *Unsupported Nanoparticulate ZnPd: Systematic Preparation and Performances in Methanol Steam Reforming*. **2013** PhD Thesis, Institute of Coal Chemistry, Chinese Academy of Sciences, Taiyuan; Max-Planck Institut für Chemische Physik fester Stoffe, Dresden.