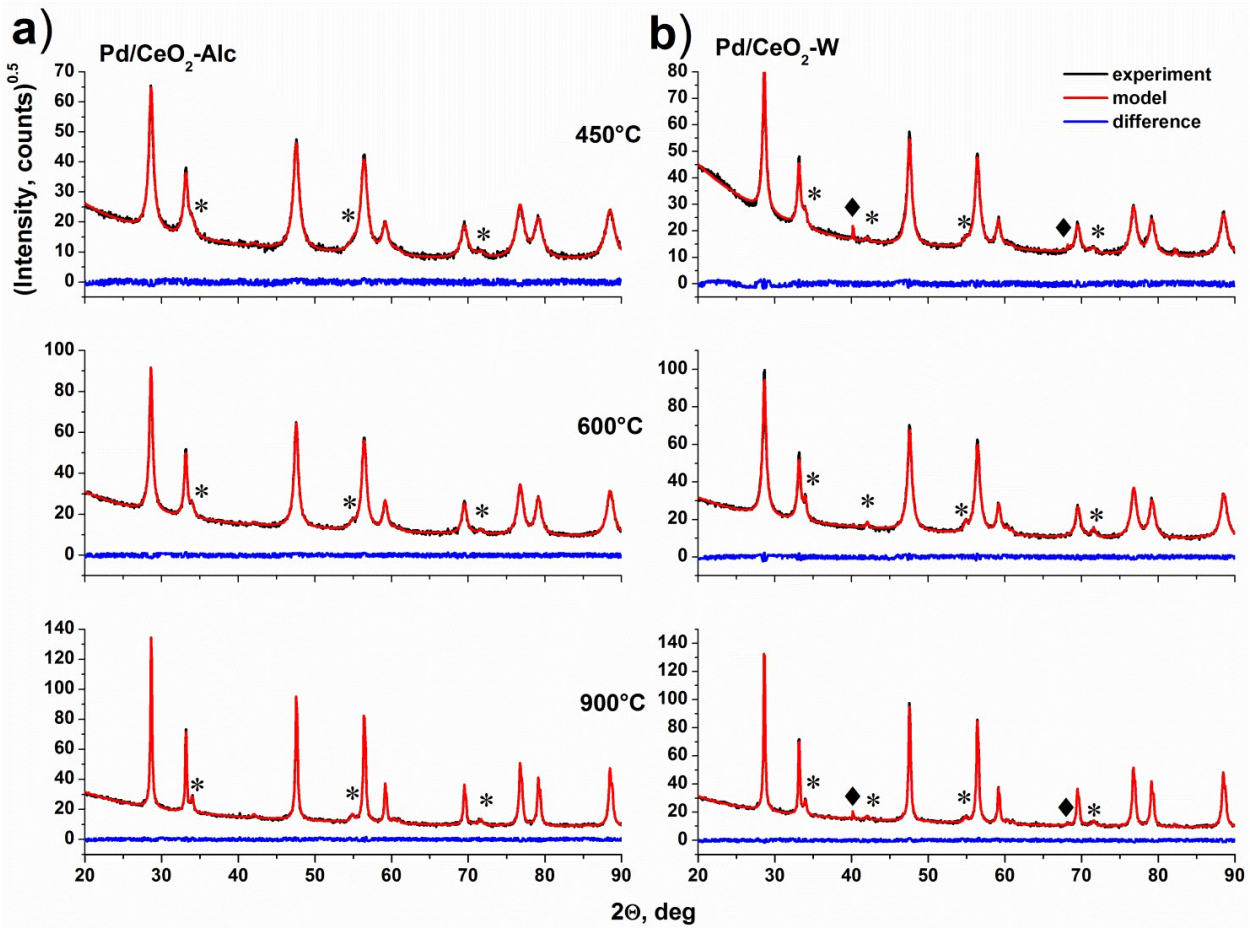


Fig. S1. X-ray diffraction patterns for $Pd/CeO_2$ catalysts calcined at 450, 600 and 900°C and synthesized by laser ablation in water (a) and ethanol (b). The experimental curves are represented by black solid lines, the fits are represented by red solid lines and the difference curves are shown by blue solid line. X-ray diffraction patterns were registered at the room temperature. Diamonds indicate the reflections of $Pd^0$, the asterisks mark PdO, the reflections of $CeO_2$ are not denoted. The scale of intensity is indicated as $I^{0.5}$.

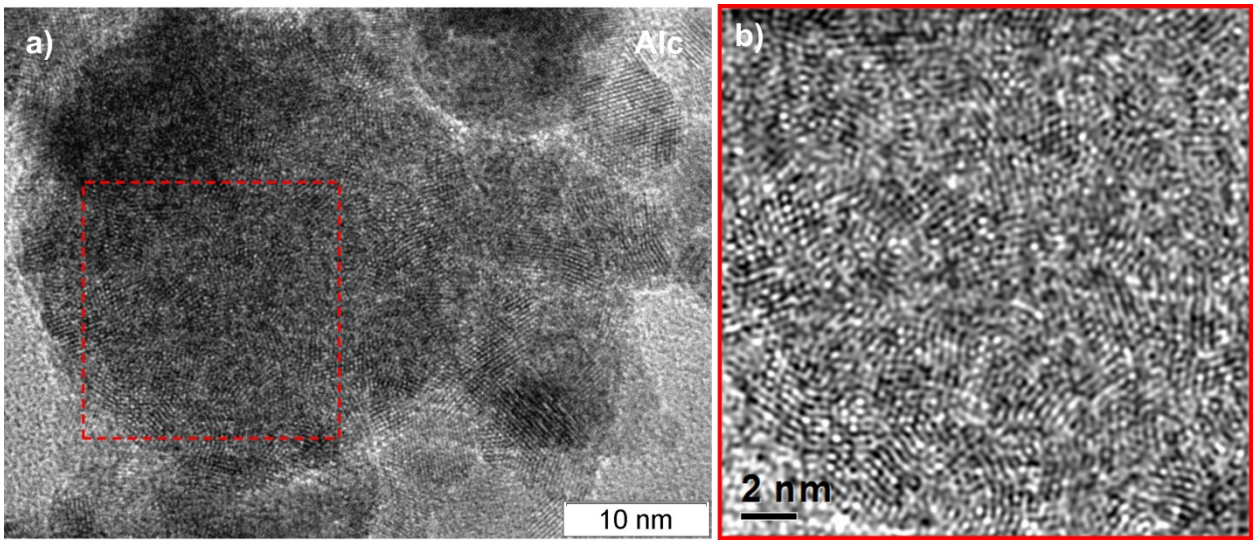


Fig. S2. a) HRTEM image of $CeO_2$ nanoparticles synthesized by laser ablation in ethanol, b) HRTEM image showing the lattice of $CeO_2$ nanoparticle marked in fig.(a) after Fourier processing

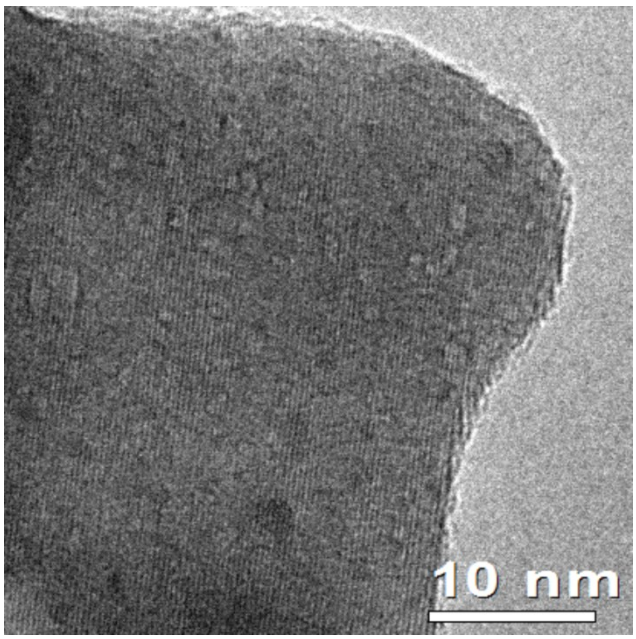


Fig. S3. BF TEM images of $Pd/CeO_2$-W-900 catalysts.

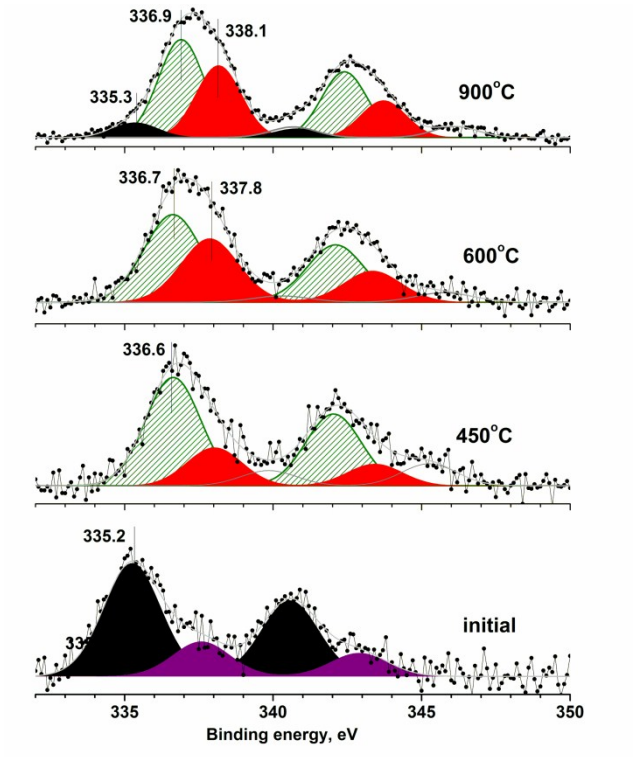


Fig. S4 Pd3d spectra for $Pd/CeO_2$-W as-prepared catalysts and catalysts calcined at 450, 600, 900°C.

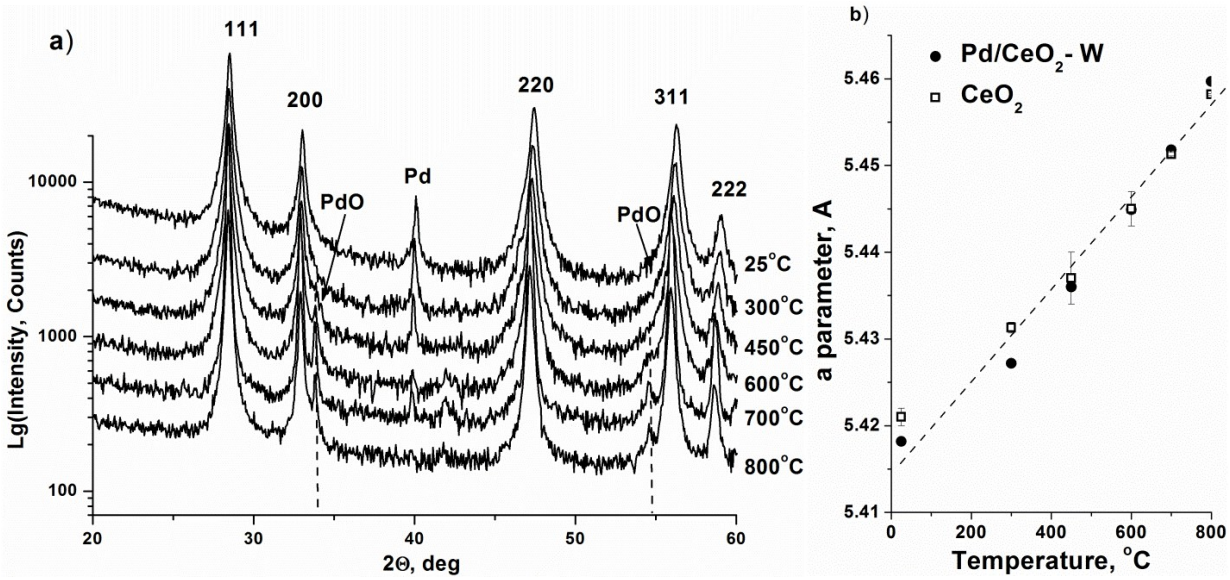


Fig. S5. (a) X-ray diffraction patterns for catalyst $Pd/CeO_2$-W obtained using *in situ* - high-temperature reaction chamber during heating in air. (b) The change in the $CeO_2$ lattice parameter during the heating. Closed circles denote lattice parameter for $Pd/CeO_2$-W sample, open squares denote lattice parameter for $CeO_2$-W sample.

Table S1. Structural characteristics of $Pd/CeO_2$-Alc samples obtained using *in situ* - high-temperature reaction chamber during heating in air.

| T, °C | Structural parameters of the phase with a fluorite structure | | |
|---|---|---|---|
| | a, Å | D, (nm) | $e_0$ |
| 300 | 5.432(1) | 8.5(2) | 0.11(1) |
| 450 | 5.4398(4) | 10.5(2) | 0.091(7) |
| 600 | 5.4499(3) | 16.4(3) | 0.072(4) |
| 700 | 5.457(1) | 17.9(3) | 0.062(4) |
| 800 | 5.4639(3) | 20.8(5) | 0.033(4) |

Table S2. Structural characteristics of $Pd/CeO_2$-W samples obtained using *in situ* - high-temperature reaction chamber during heating in air.

| T, °C | Structural parameters of the phase with a fluorite structure | | |
|---|---|---|---|
| | a, Å | D, (nm) | $e_0$ |
| 25 | 5.4182(4) | 16(3) | 0.09(1) |
| 300 | 5.4272(4) | 15.4(6) | 0.09(1) |
| 450 | 5.4360(4) | 15.9(6) | 0.08(1) |
| 600 | 5.4449(4) | 16.9(6) | 0.06(1) |
| 700 | 5.4518(3) | 18.4(5) | 0.04(1) |
| 800 | 5.4597(2) | 25(1) | 0.038(5) |