Fabrication of lignin nanosphere by emulsification in binary γ-valerolactone/glycerol system and its application as a bifunctional reducer and carrier for Pd nanoparticles with enhanced catalytic activity

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Fig. S1

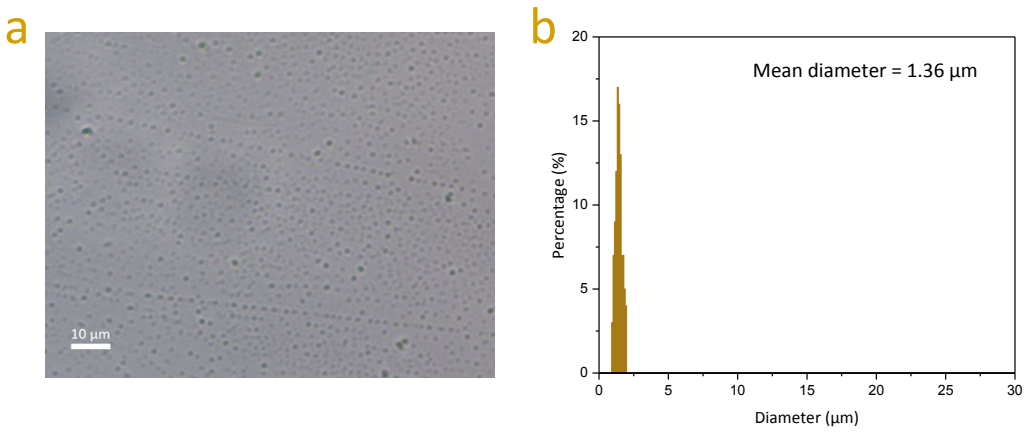

Figure S1. Microscopic photo of lignin-containing GVL droplets after cooling to room temperature (A) and their size distribution (B).

Fig. S2

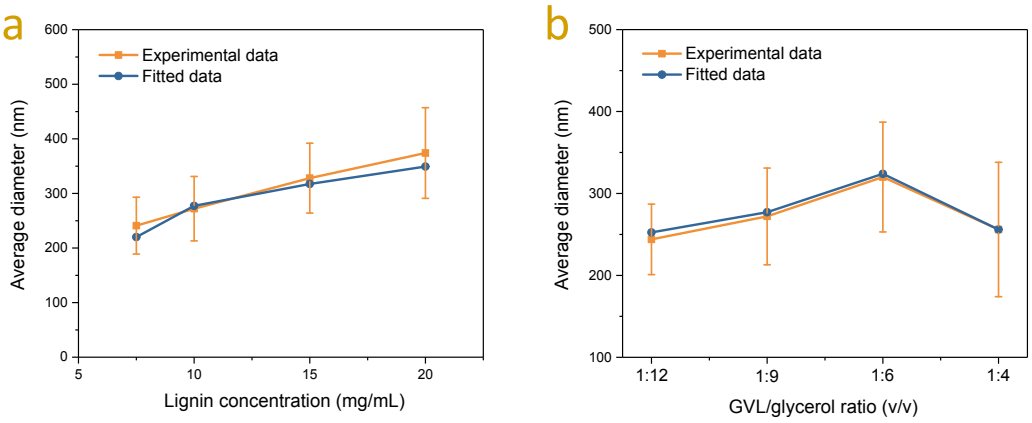

Figure S2. Comparison of the experimental data and the fitted data on the particle size of lignin nanospheres obtained under varied preparation conditions: (a) different initial lignin concentration (mg/mL) and (b) different GVL/glycerol ratio (v/v)

Fig. S3

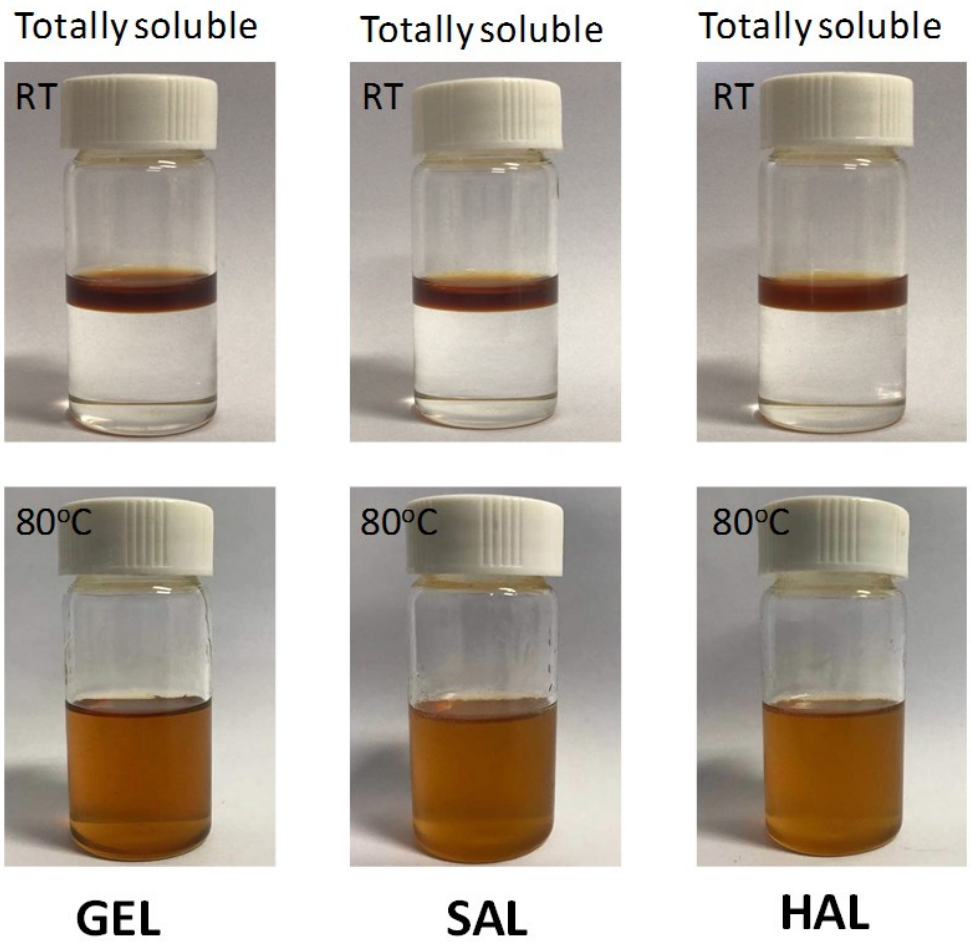

Figure S3. Pictures of dissolution of ethanol lignin from corn stalk (GEL), alkaline lignin from pine (SAL), and alkaline lignin from poplar (HAL) in binary GVL/glycerol solvent system at room temperature and 80 °C, respectively.

Fig. S4

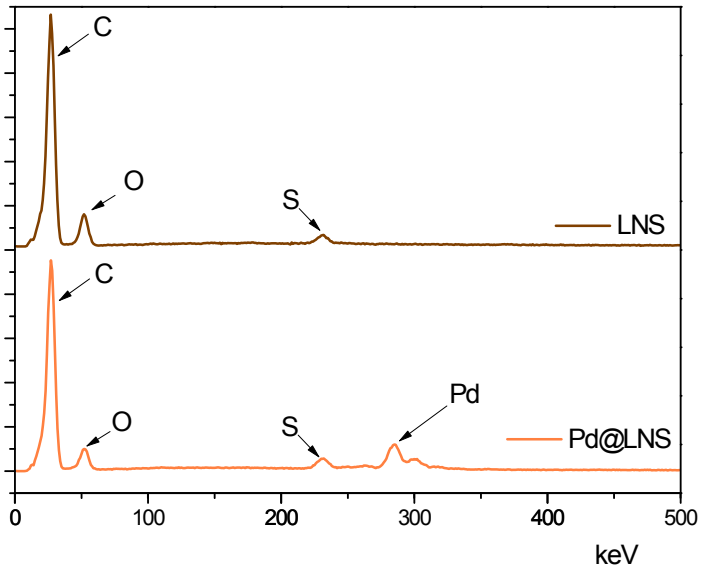

Figure S4. Energy dispersive X-ray (EDX) analysis of Pd@LNS and pure LNS

Fig. S5

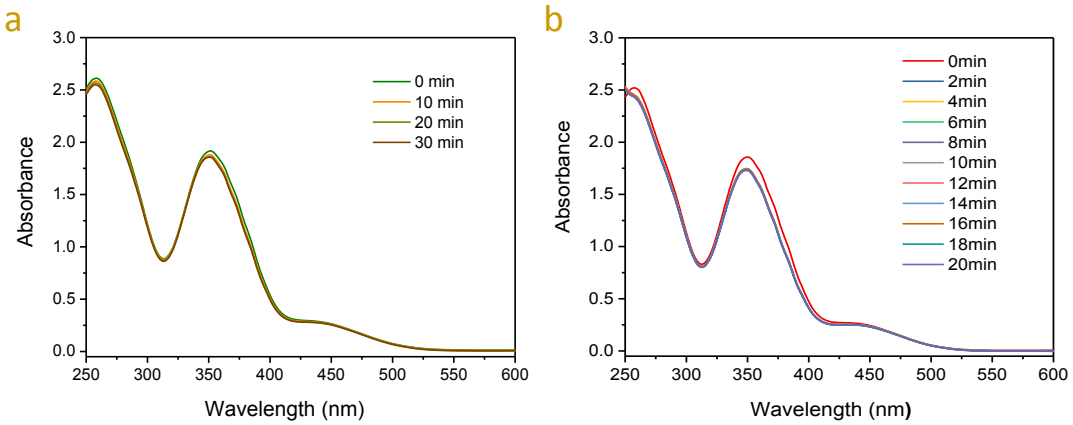

Figure S5. Variation of time dependent UV-vis spectra for Cr(VI) aqueous solution treated with LNS only (a) and formic acid only (b).

Fig. S6

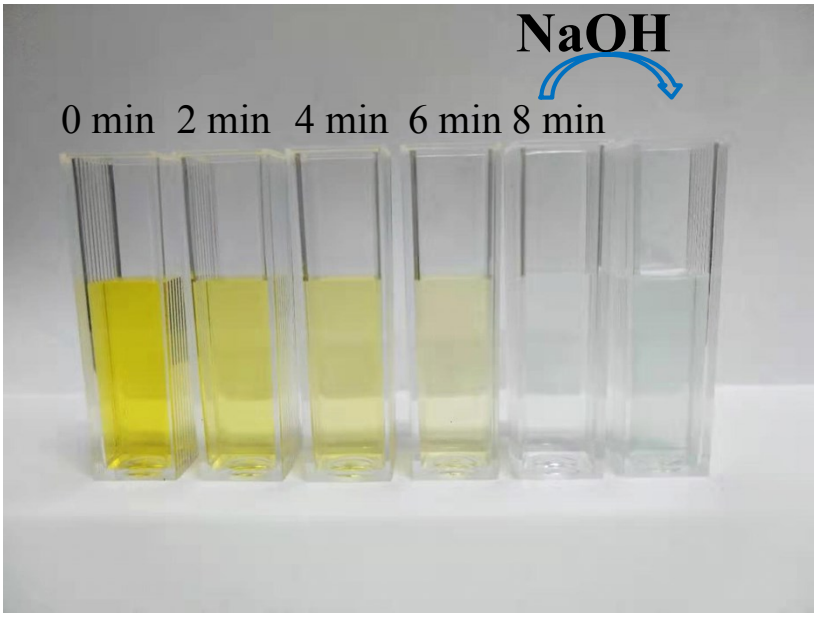

Figure S6. Photographic illustrations of color change of aqueous Cr(VI) solution by Pd@LNS catalytic reduction in the presence of formic acid.

Fig. S7

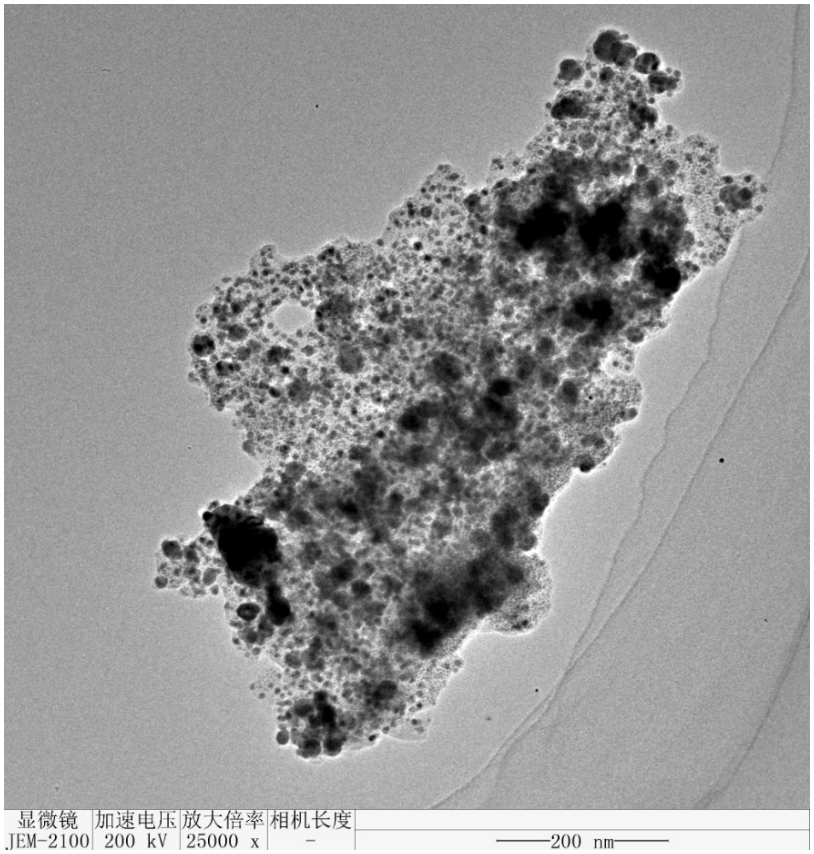

Figure S7. TEM image of bare Pd NPs without LNS supporting, obvious aggregations were observed, resulting in much larger particle size.

Fig. S8

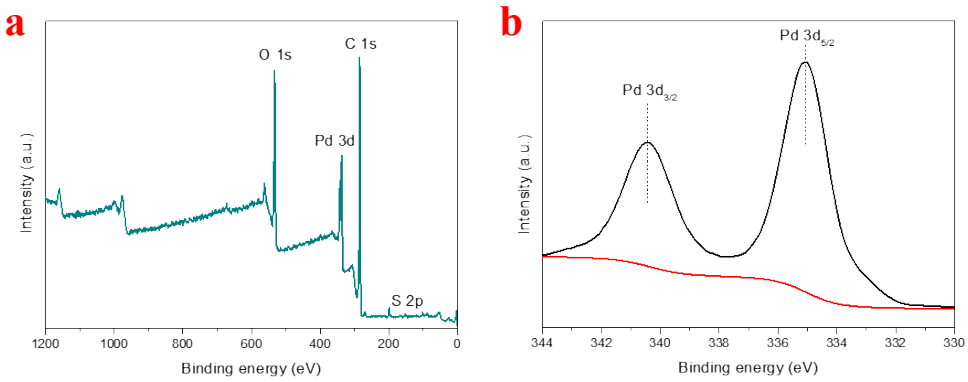

Figure S8. (a) XPS survey spectrum of Pd@LNS, (b) high resolution XPS spectrum of Pd 3d for Pd@LNS after eight recycled tests.