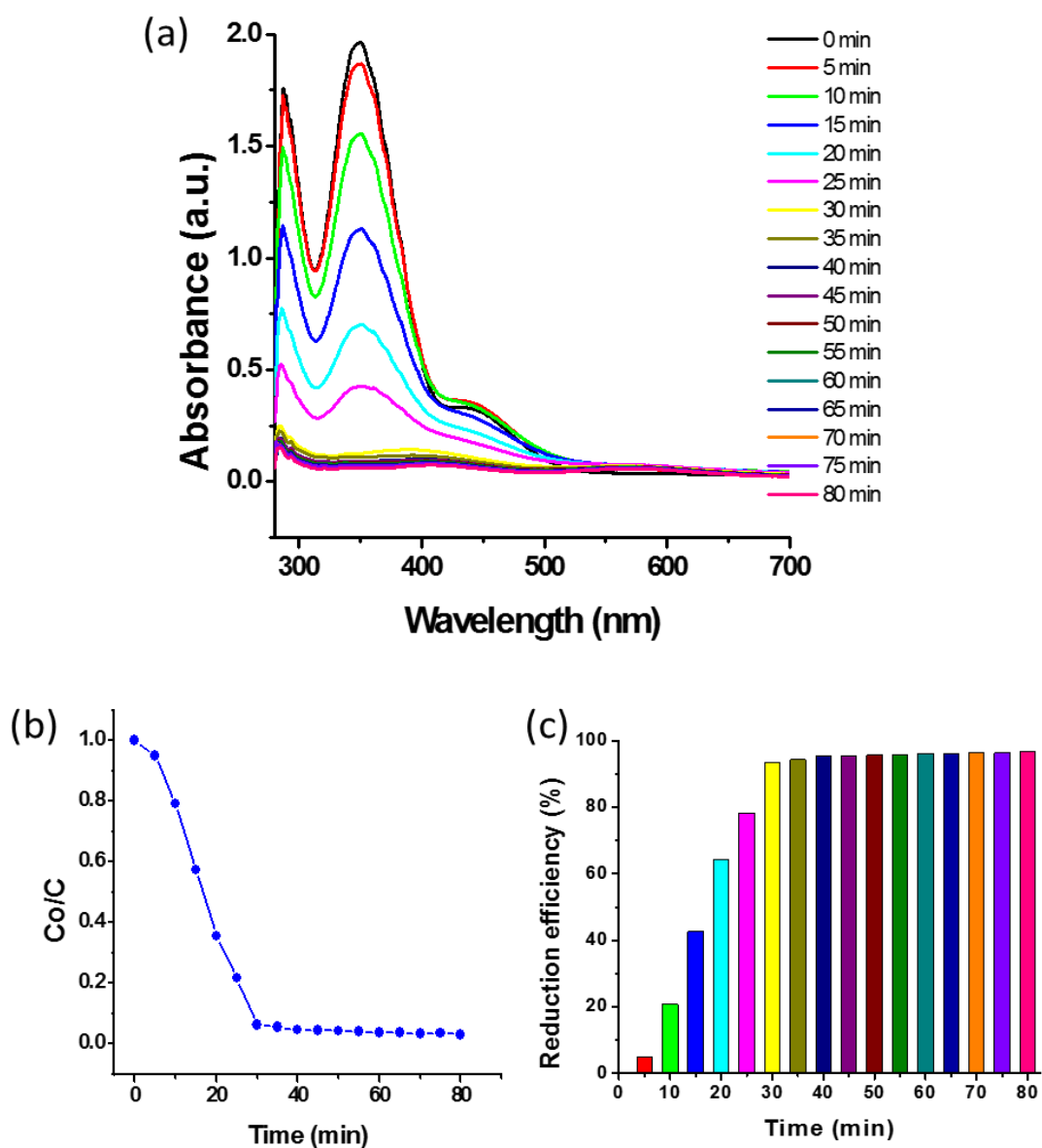
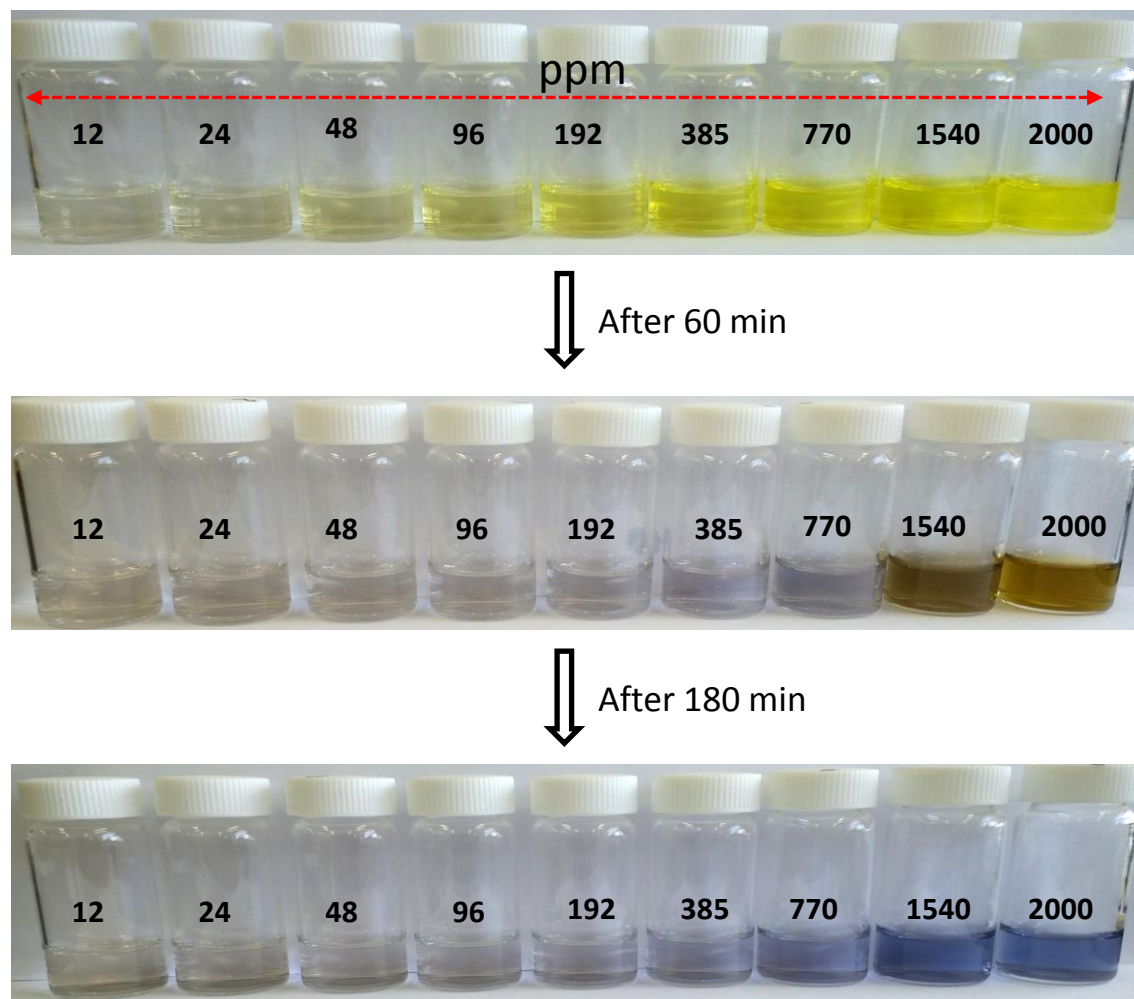


# Reclamation of hexavalent chromium using catalytic activity of highly recyclable biogenic Pd(0) nanoparticles

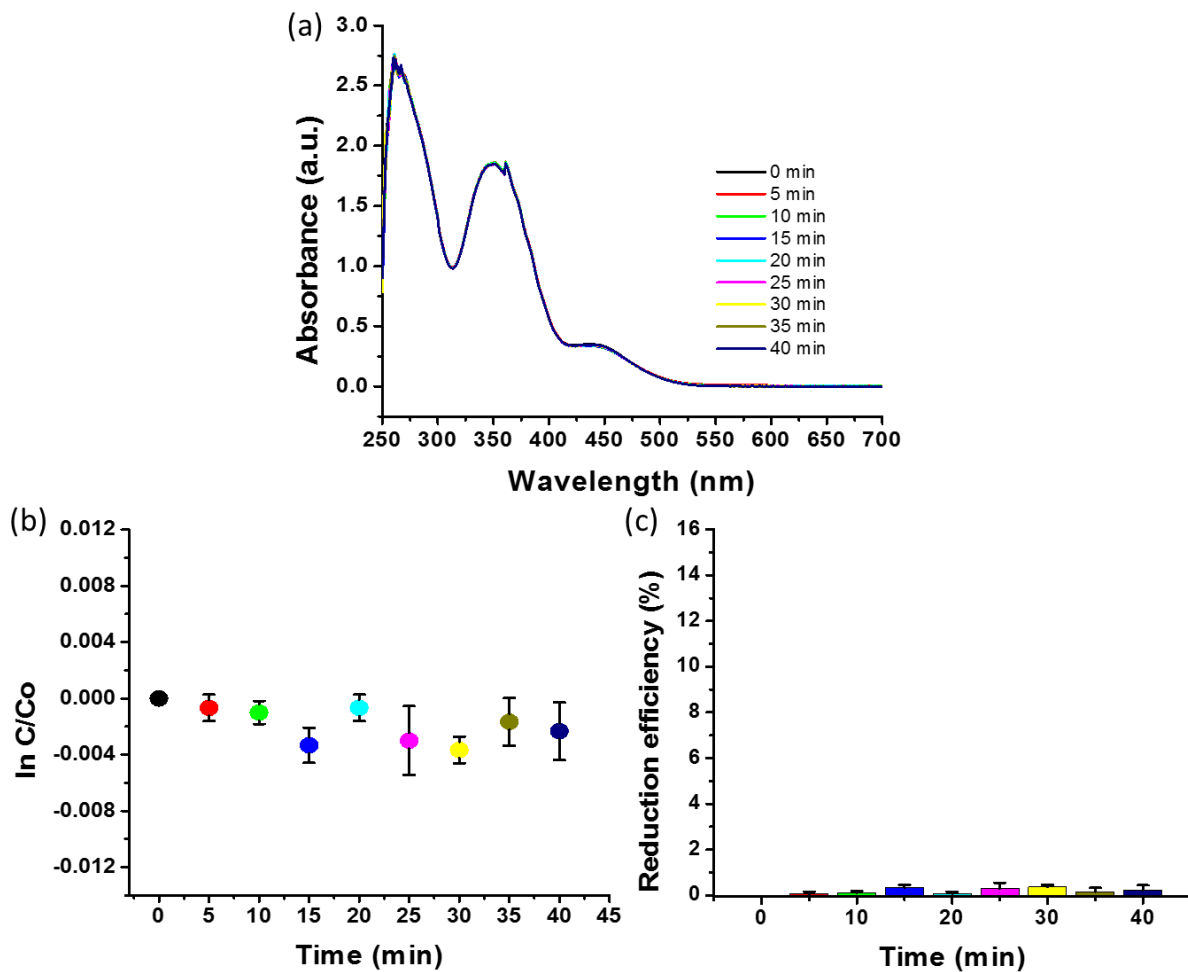
R.M. Tripathi<sup>1,2</sup> and Sang J. Chung<sup>1\*</sup>



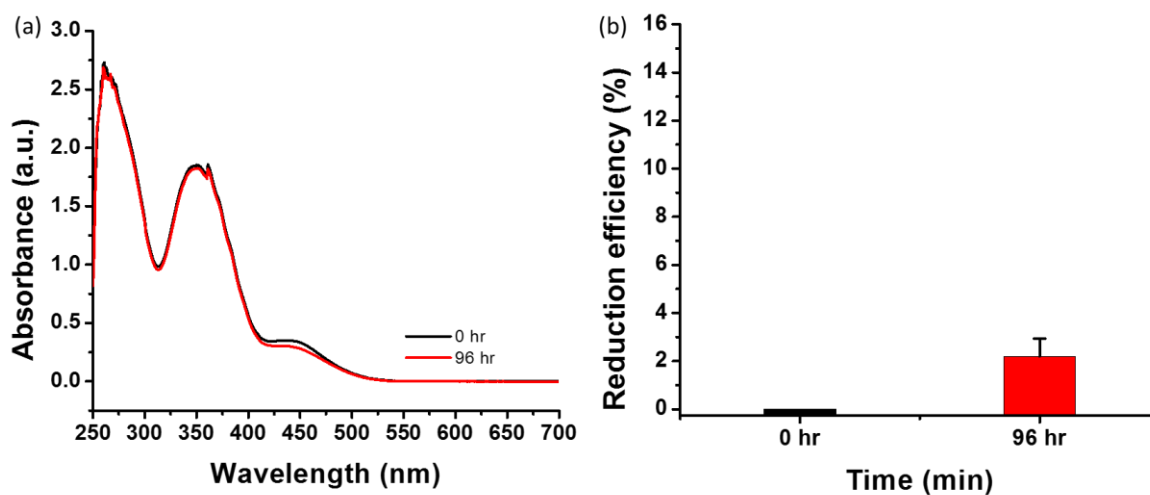
**Figure S1.** Analysis of the catalytic activity of PdNPs: (a) Absorbance spectra changes at 350 nm for Cr (VI) in the presence of PdNPs over time; (b) Reduction kinetics of Cr (VI) represented by  $C/C_0$ ; (c) Reduction efficiency (%) versus time



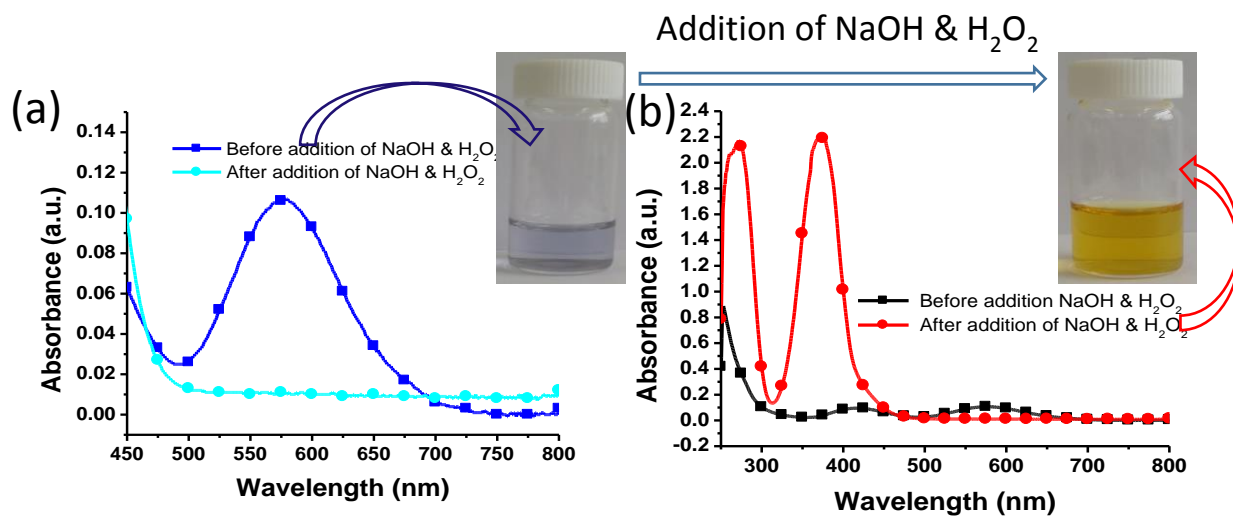
**Figure S2.** Visible colour changes of various concentrations of Cr (VI) due to the catalytic reduction into Cr (III) using PdNPs (0.043 ppm) in the presence of 0.26 M formic acid



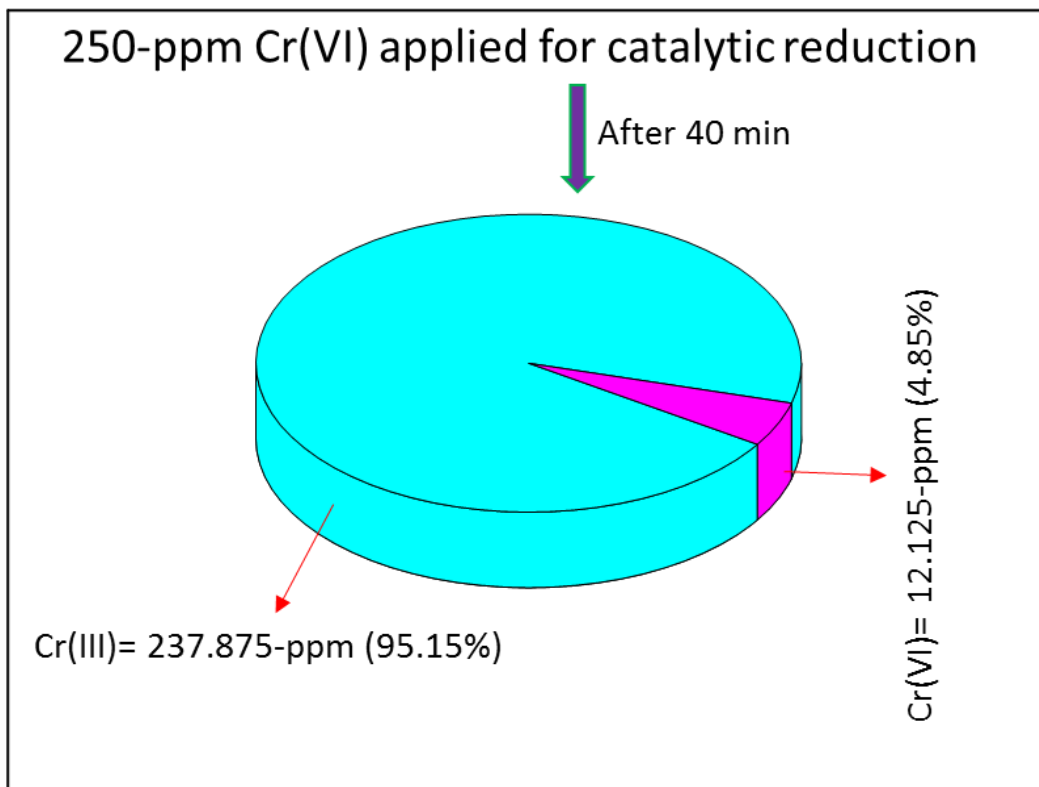
**Figure S3.** Role of leaf extract in the Cr (VI) reduction after 40 min of incubation: (a) Absorbance spectra for Cr (VI) in the presence of leaf extract as a function of time; (b) Plot of  $\ln(C/C_0)$  versus time; (c) Reduction efficiency (%) versus time



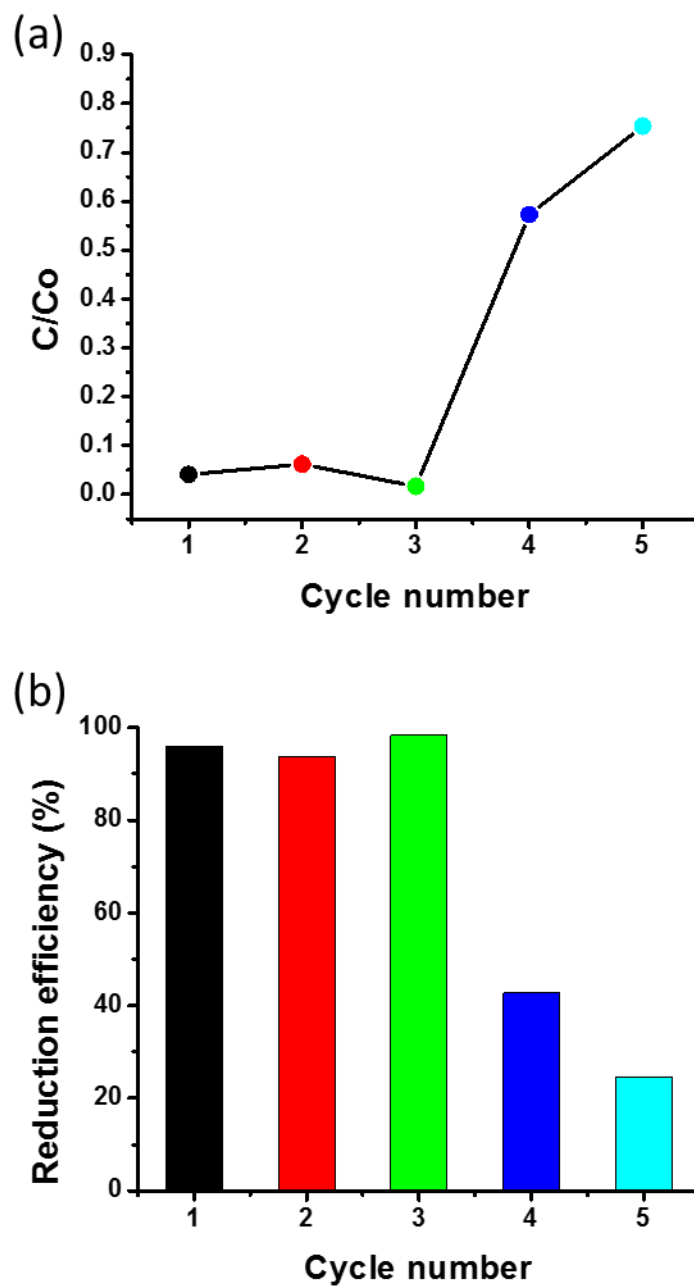
**Figure S4.** Role of leaf extract in the Cr (VI) reduction after 96 h of incubation: **(a)** absorbance spectra for Cr (VI) in the presence of leaf extract as a function of time; **(b)** reduction efficiency (%) versus time



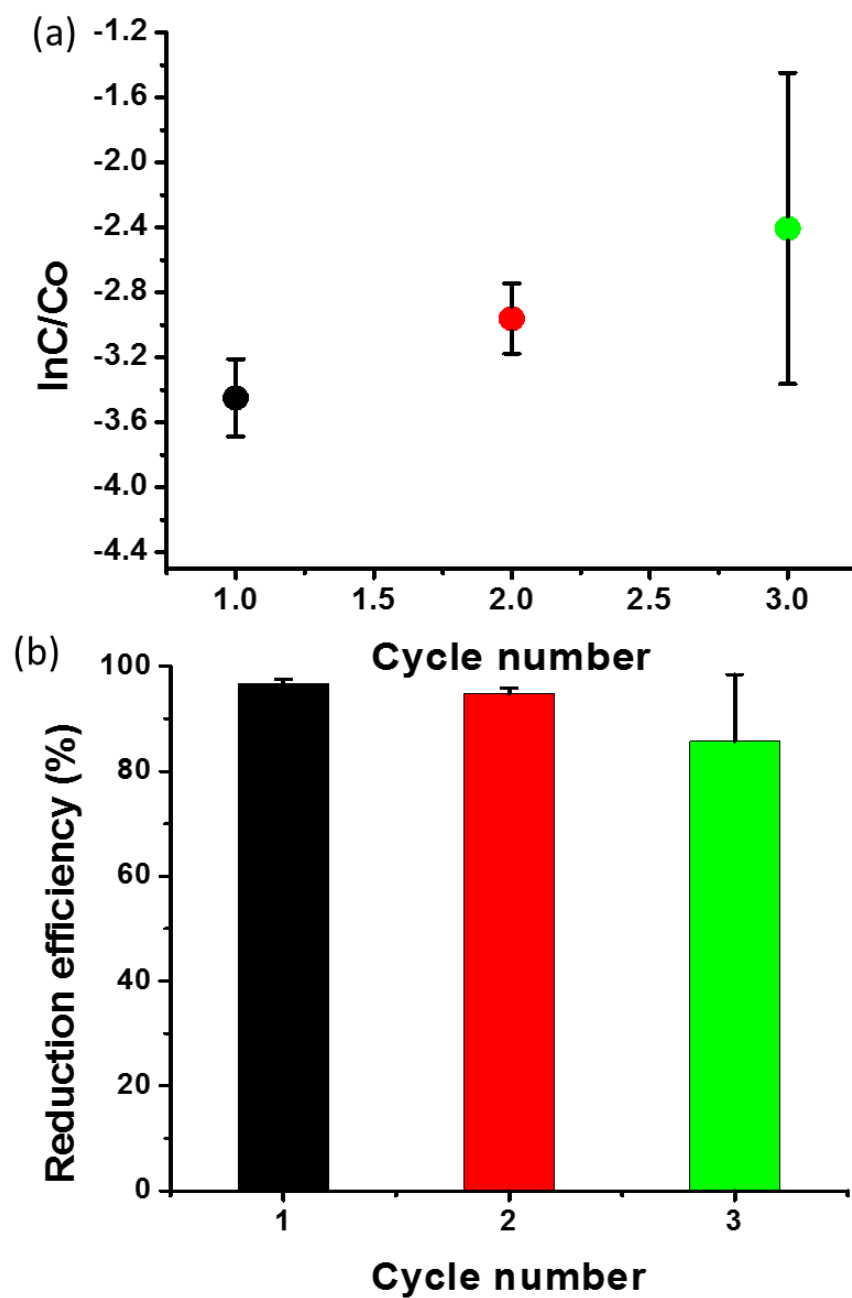
**Figure S5.** Detection of the catalytic conversion of Cr (VI): (a) UV-vis spectra of the catalytic product (inset shows the vial containing the catalytic product); (b) UV-vis spectra obtained after the addition of NaOH and H<sub>2</sub>O<sub>2</sub> (vial in the inset shows the colour change)



**Figure S6.** Representation of the catalytic reduction in the form of percentage of Cr species



**Figure S7.** Reusability without recovery or purification, but with the addition of formic acid: (a) reduction kinetics represented by  $C/C_0$  versus the cycle number; (b) reduction efficiency (%) versus the cycle number



**Figure S8.** Reusability of the PdNPs after recovery or purification: (a) Reduction kinetics represented by  $\ln(C/C_0)$  versus the cycle number; (b) Reduction efficiency (%) versus the cycle number



Element	Line Type	k Factor	Absorption Correction	Wt%	Wt% Sigma	Atomic %
Cu	K series	1.233	0.54	14.23	0.43	21.75
Pd	L series	1.809	0.62	85.77	0.43	78.25
<b>Total:</b>				100.00		100.00

**Table S1.** Energy-dispersive X-ray analysis results indicating the elemental composition of the biosynthesised Pd nanoparticles (PdNPs)

Label	Element Label	Conc.	%RSD	Unadjusted Conc.	Intensity	%RSD
Blank	Pd (340.458 nm)	0.0026 (mg/kg)	12.48	0.0026 (mg/kg)	29.9134	4.84
Pd	Pd (340.458 nm)	0.2152 (mg/kg)	1.16	0.2152 (mg/kg)	976.6761	1.14

**Table S2.** Pd concentration in 1 mL of aqueous solution (50  $\mu$ L of as-synthesised PdNPs + 950  $\mu$ L of deionised water)