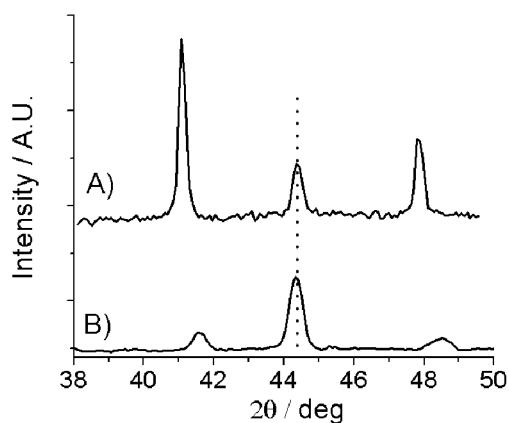
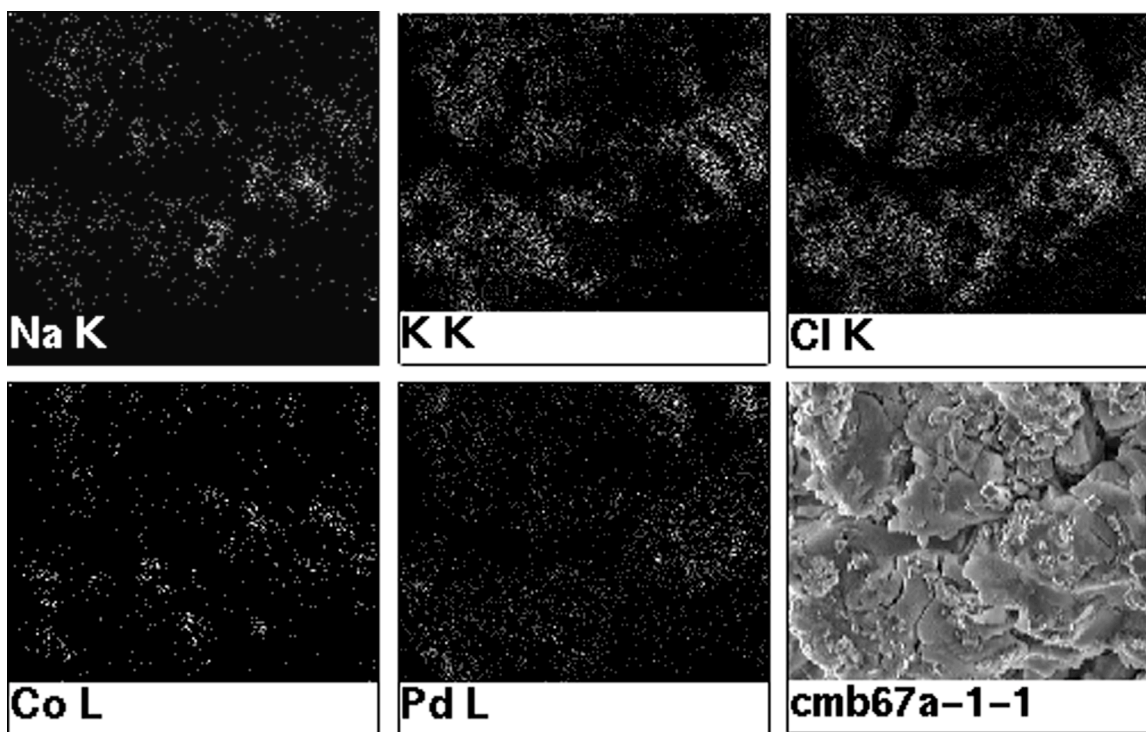


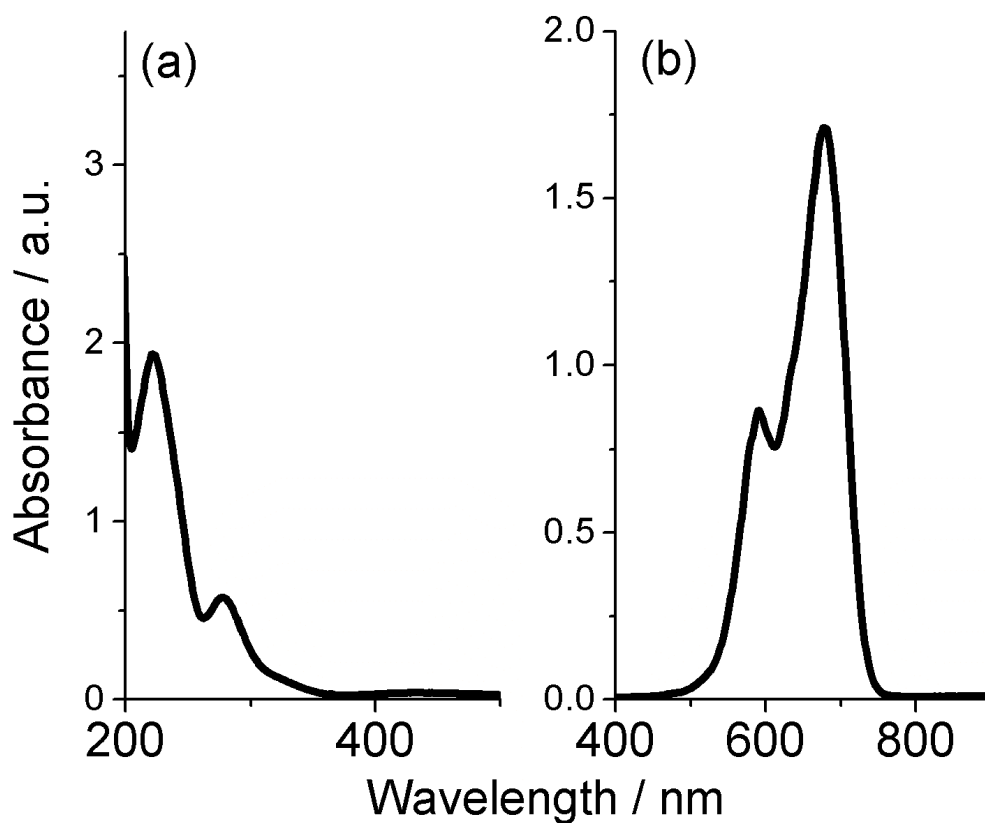
**Supplement Figure 1** Powder X-Ray diffraction patterns showing that alloys result from heating cyanogel precursors to 1000°C for 1 hr. Peaks for an internal Cr standard are marked by \*. A) Precursor: 500mM 2:1 Pd:Co xerogel. Reflections for a FCC palladium cobalt alloy are seen (lattice parameter ( $a$ ) = 3.82 Å). B) Precursor: 500mM 2:1 Pt:Co xerogel. Reflections for a FCC platinum cobalt alloy are seen ( $a$ = 3.82 Å). C) Precursor: 500mM 2:1 Pd:Pd xerogel. Reflection for FCC palladium metal (  $a$ = 3.89 Å) D) Precursor: 500mM 2:1 Pd:Fe<sub>NH3</sub>. Reflections for a palladium iron alloy are seen ( $a$ =3.86 Å). E) Precursor: 500mM 2:1 Pd:Ru xerogel. Reflections for FCC palladium metal (  $a$ = 3.89 Å) and HCP ruthenium metal ( $a$ = 2.71 Å) are seen. F) Precursor: 500mM 2:1 Pd:Fe<sub>py</sub>. Reflections for a palladium iron alloy are seen ( $a$ =3.81 Å).



**Supplement Figure 2** The composition of the macroporous alloy can be altered by changing the initial ratio of metal in the precursor. A) 1.5:1 Pd:Co precursor produces a macroporous FCC Pd:Co alloy that is  $65 \pm 3\%$  Pd (lattice parameter ( $a$ ) =  $3.798 \text{ \AA}$ ) when heated to  $1000^\circ\text{C}$ . B) 1:1 Pd:Co precursor produces a macroporous FCC Pd:Co alloy that is  $50 \pm 3\%$  Pd ( $a=3.751 \text{ \AA}$ ). Excess salt is required to form the porous morphology at this ratio as decreasing the amount of Pd precursor decreases the amount of chloride salt present in the precursor below that necessary to form the porous morphology. Dashed line is a Cr internal standard.



**Supplement Figure 3:** EDX mapping of the interior of metal salt intermediate produced by heating a 2-1 Pd-Co xerogel to 650°C shows that Pd, Co, Na, K and Cl are evenly distributed through out the material.



**Supplement Figure 4:** Both the Pd and Co components of the Pd-Co alloy are soluble in the molten alkali chloride flux found at high temperature. A Pd-Co alloy was heated in an excess of NaCl and KCl. After cooling the alkali chloride was evaluated (a) the alkali chloride was extracted with acetone and the acetone UV-Visible spectra shows peaks associated with  $\text{Co}^{2+}$  complexes of acetone and  $\text{Cl}^-$  (b) UV-Visible of salt dissolved in water showed peaks corresponding to  $\text{PdCl}_4^{2-}$