

A successful process to prevent corrosion of rich Gd-based room temperature magnetocaloric material during ageing.

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Supplementary Information

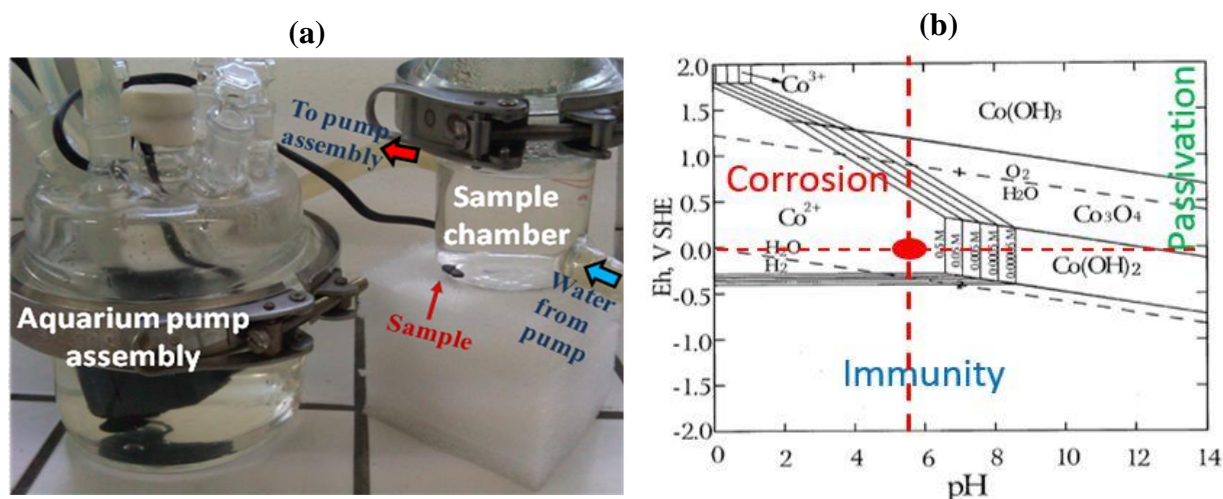


Figure S 1: (a) Photography of the pilot used for water ageing. (b) Pourbaix diagram of cobalt with corrosive, passive and immunity region marking.

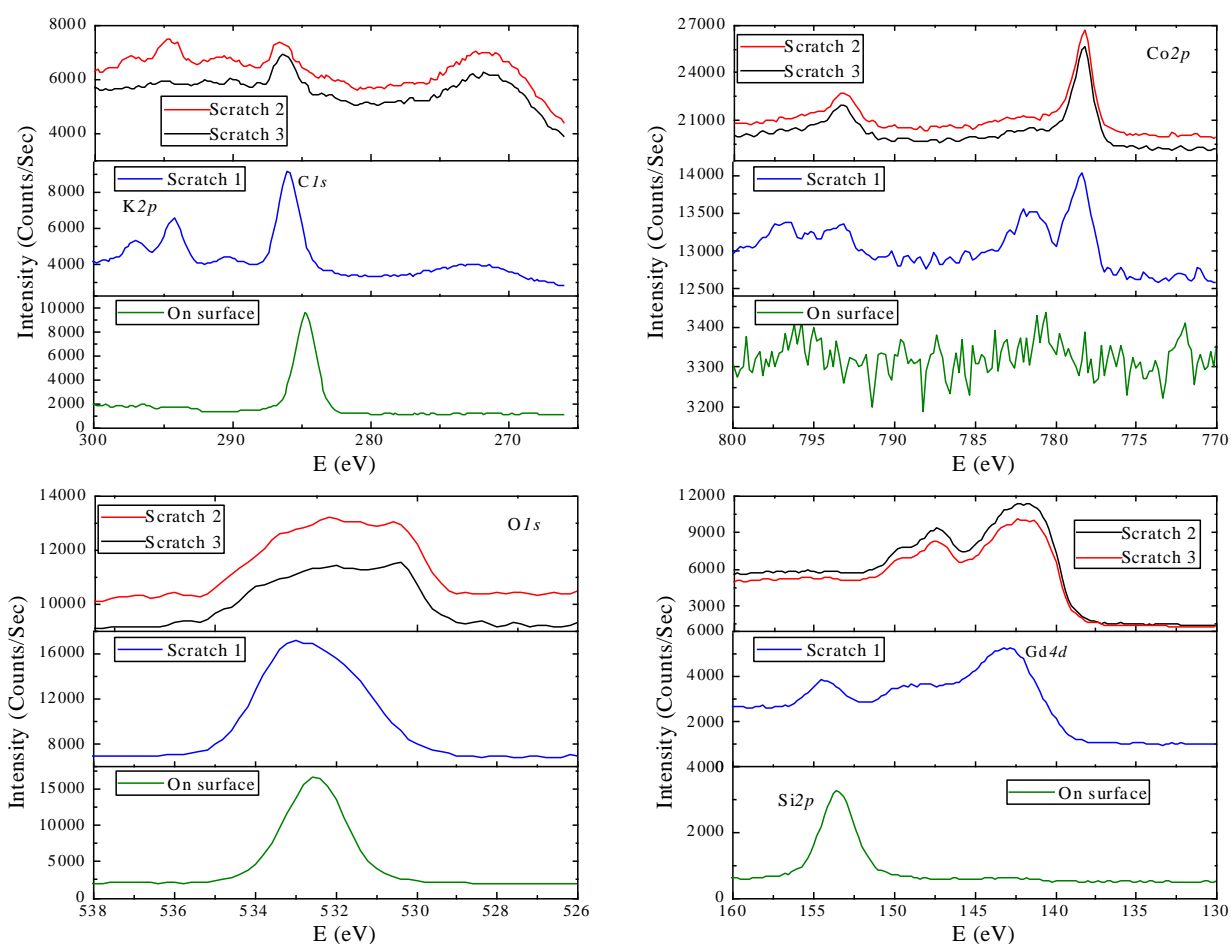
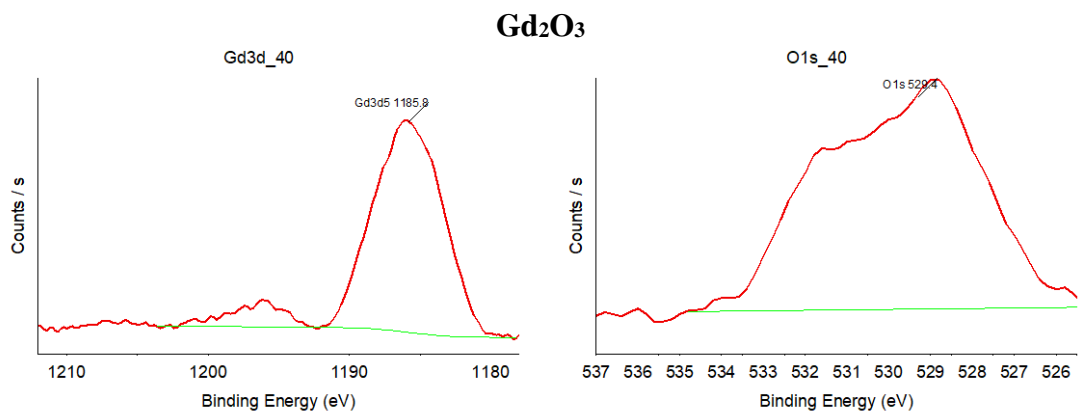
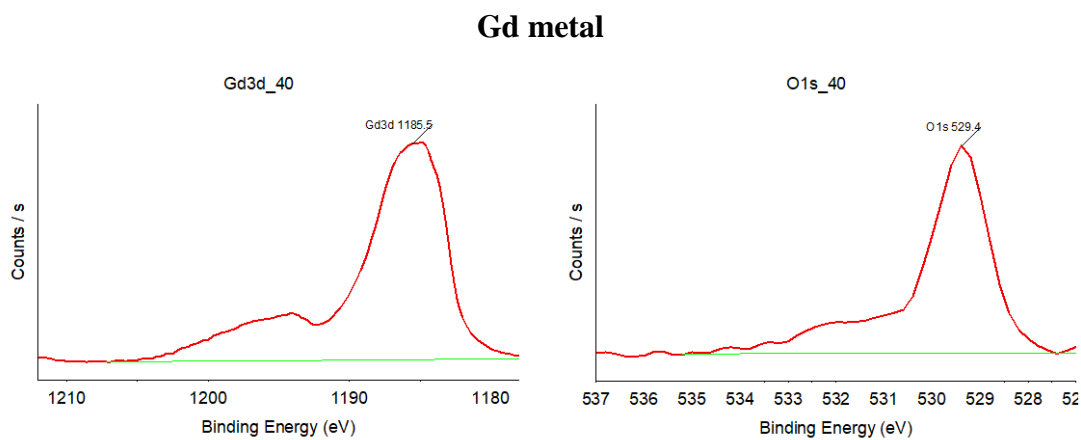


Figure S 2: XPS study on 3 month KOH aged samples to highlight the change in the XPS spectra along depth with respect to the scrapped approach for (a) K_{2p}-C_{1s}-Gd_{4p3}, (b) Co_{2p}, (c) O_{1s} and (d) Si_{2s}-Gd_{4d}.



(a) (c)



(b) (d)

Figure S 3: Comparison of XPS Gd3d_{5/2} spectra (a, b) and O1s spectra (c, d) respectively on Gd₂O₃ and Gd metal.

Schematic demonstrating the corrosion steps	Oxidation/Reduction	E ⁰ (eV)	Electrochemical reaction
	O_2/OH^-	+0.401	$O_2 + 2H_2O + 4e^- \leftrightarrow 4OH^-$ (1)
	Co^{2+}/Co	-0.28	$Co^{2+} + 2e^- \leftrightarrow Co$ (2)
	SiO/Si	-0.80	$SiO + e^- + 2H^+ \leftrightarrow Si + H_2O$ (3)
	$Si^{IV}O_2/SiO$	-0.857	$SiO_2 + 2e^- + 2H^+ \leftrightarrow SiO + H_2O$ (4)
	$Si^{IV}O_3^{2-}/SiO$	-1.697	$SiO_3^{2-} + 4e^- + 4H^+ \leftrightarrow SiO + 2H_2O$ (5)
	Gd^{3+}/Gd	-2.30	$Gd \leftrightarrow Gd^{3+} + 3e^-$ (6)

Table S 1 : Electrochemical reaction details for selected metals and metal oxides along with required potential (E⁰) [16]. [Haynes, W.M., ed. *CRC Handbook of Chemistry and Physics*. 93 ed. 2012 -2013, CRC Press.]