Supplementary Materials: Hydrogen Storage Stability of Nanoconfined MgH_2 upon Cycling

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Table S1. The mass of scaffold, initial pore volume, and gain in mass of each infiltration of $MgBu_2$ (denoted $\Delta m1$, $\Delta m2$ and $\Delta m3$) for the four nanoconfined samples. The calculated amount of infiltrated magnesium hydride is provided as mass and relative to the sample mass (wt%).

Carbon aerogels	*m*(scaffold) / g	V_{tot} / cm^3	$\Delta m1$ / g	$\Delta m2$ / g	$\Delta m3$ / g	m(MgH_2) / g	MgH_2 / wt%
X1	0.5023	0.66	0.3404	0.2459	0.2861	0.1658	24.8
X2	0.3886	0.51	0.2435	0.2284	0.1842	0.1247	24.3
CX1	0.1648	0.39	0.1755	0.1360	0.1996	0.0971	37.1
CX2	0.1678	0.40	0.2672	0.1957	0.1342	0.1135	40.3

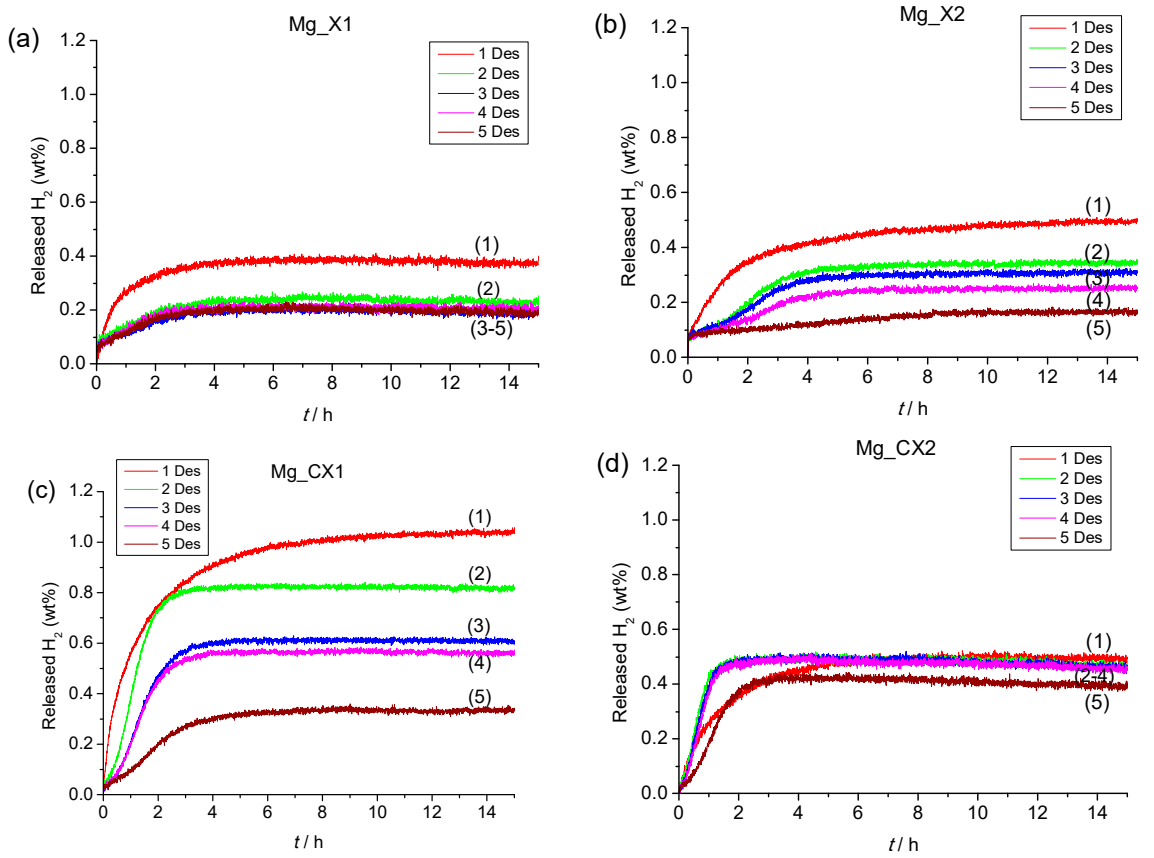

Figure S1. Sievert's measurements of (a) Mg_X1 (b) Mg_X2 (c) Mg_CX1 (d) Mg_CX2 under *condition* 2 (desorbed 15 h under $p(H_2)$ = 4 bar and absorbed 15 h under $p(H_2)$ = 12 bar, cycled at 355 °C)

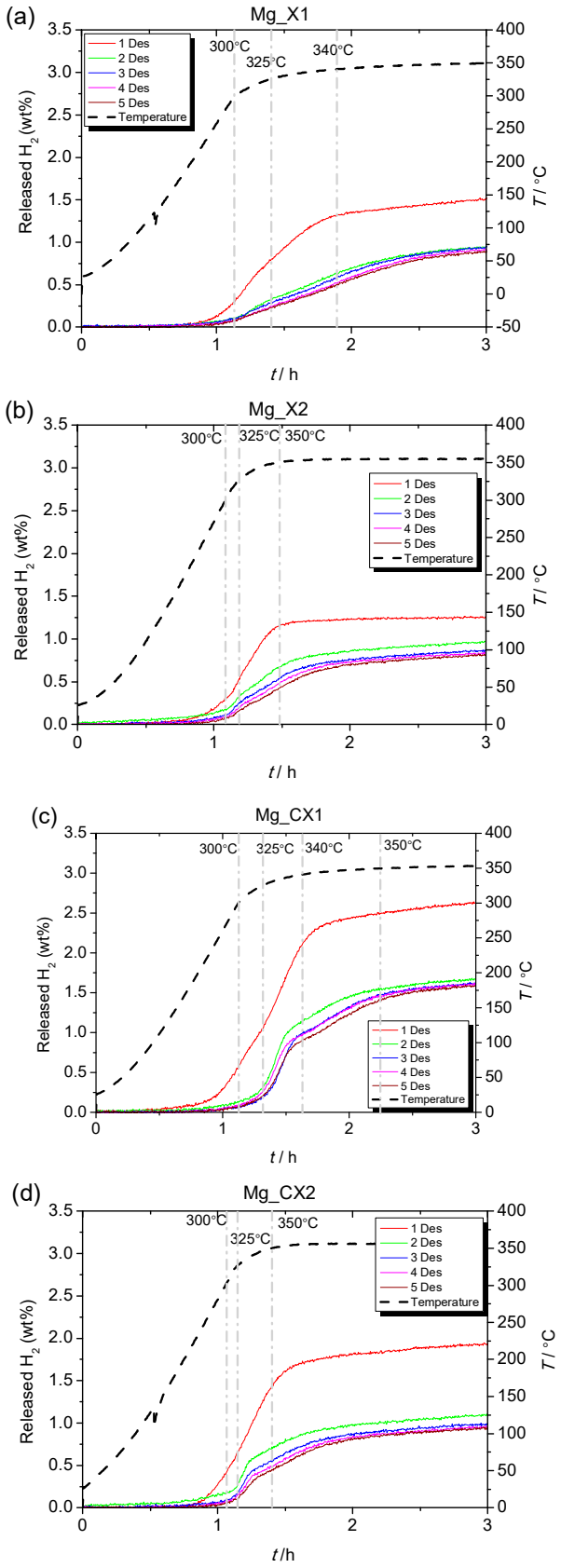

Figure S2. Sievert's measurements of the first 3 hours of (a) Mg_X1 (b) Mg_X2 (c) Mg_CX1 (d) Mg_CX2 under *condition* 1. Samples heated from room temperature in vacuum to 355 °C ($\Delta T/\Delta t$ = 5 °C/min) for 15 h and reabsorbed for 15 h under $p(H_2)$ = 50 bar.

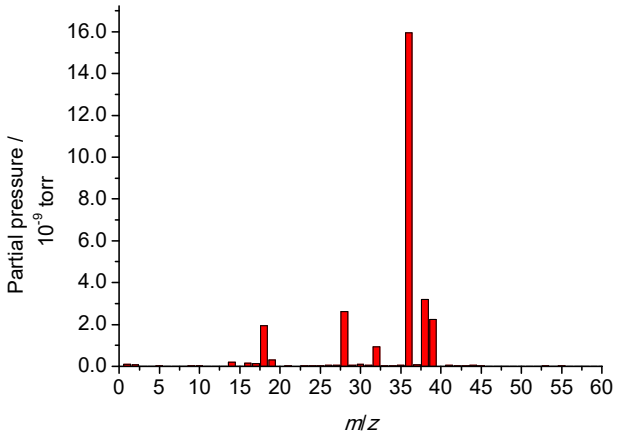

Figure S3. Mass spectroscopic analysis of the gas release from the as-prepared Mg_X1 at 348 °C

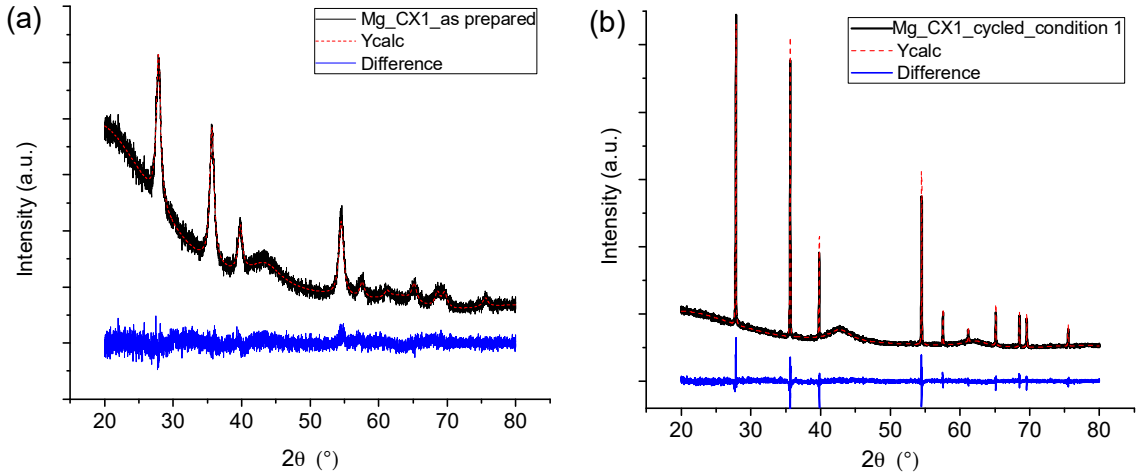

Figure S4. Rietveld refinement and difference plot of (a) as-prepared and (b) cycled Mg_CX1.