Table S1. Doping effect of selected Metallic–Based Catalysts on the hydrogen Storage Characteristics and Kinetics Behavior of MgH_2 Powders*

Catalysts	Dose (wt%)	Doping technique	Storage capacity (wt%)/pressure (bar)/ Temp. (°C)/time (min)	E_a of deco (kJ/mol)	Ref.
Pure Metals					
Ni-nanofibers	10	Ar- HEBM/4h	Abs: 5/10/350 /6.1 Des: NA	72	14
Zr	1 at%	H_2-RBM/20 h + annealing at 100 °C/40 bar H2/24 h	Abs: 3.5/10/100/100 Des: 5.5/0.2/350/20	40	15
Nb-NPs	7.5	hydrogen plasma-metal reaction	Abs: 5.7/40/200/60 Des: 4/NA/300/60	86.4	16
Intermetallic compounds and alloys					
$Ti_{0.4}Cr_{0.15}Mn_{0.15}V_{0.3}$	20	Ar- HEBM/3 h	Abs: 6.5/20/350/300	71.2	17
ZrCrNi	10	Ar- HEBM/6 h	Abs: 5.8/5/300/30 Des: 5.8/0.1/300/45	NA	18
TiAl	14	H_2-RBM/4 h	Abs: 4/1/100/30 Des: 4/0.1/240/7	65	19
$LaNi_5$	5	H_2-RBM/40 h	Abs: 5.1/20/285/45 Des: 5.1/0.1/285/30	NA	20
$ZrNi_5$	10	H_2-RBM/50 h	Abs: 5.3/10/250/30 Des: 5.3/0.2/250/15	NA	21
Metallic glasses					
$Zr_{70}Ni_{20}Pd_{10}$	10	Cryo-milling/50 h	Abs: 6/10/100/1.18 Des: 6/0.2/200/3.8	92	22
Zr_2Ni	10	Cryo-milling/50 h	Abs: 6/10/250/1.15 Des: 6/0.2/250/2.5	83	23
Ti_2Ni	10	Cryo-milling/25 h	Abs: 5.7/10/225/6.7 Des: 5.7/0.2/250/6.7	87.3	24
$LaNi_3$	7	Cryo-milling/50 h + 100 h of rod-milling	Abs: 6/10/200/8 Des: 6/0.2/225/2	73.26	25
Quasicrystal metastable phase					
$Al_{65}Cu_{20}Fe_{15}$		Ar- HEBM/40 h	Abs: 6/10/250/0.5 Des: 6.25/0.2/324/2.7	64.25	26

*NPs: nanoparticles; HEBM: high-energy ball milling; RBM: reactive ball milling;
Abs: absorption; Des: desorption;
Deco: decomposition; NA: not available.

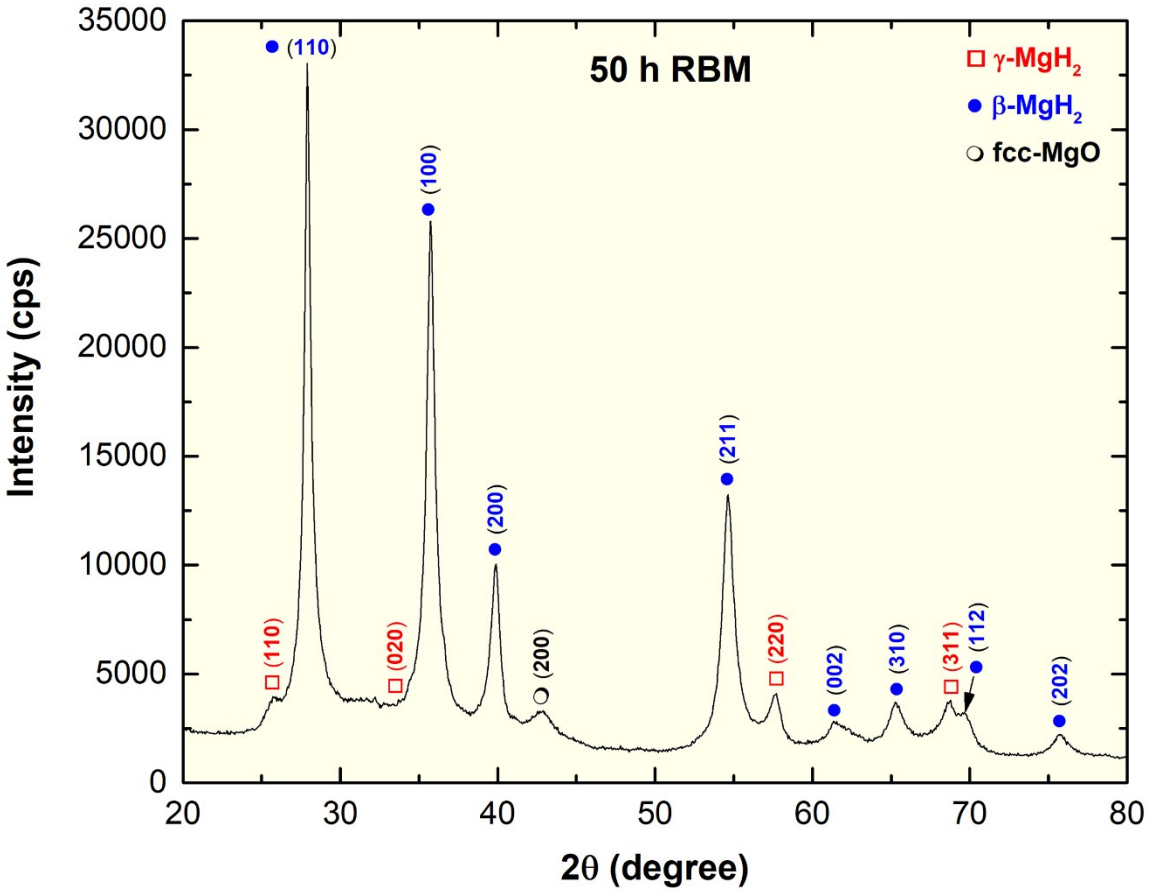

Figure S1. XRD patterns of MgH_2 powders obtained after 50 h of RBM time.