Transition metal (Co, Ni) nanoparticles clad with carbon and their superior catalytic activities for the reversible hydrogen storage of magnesium hydride

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Symbol	Model	g(a)
D1	one-dimensional diffusion	α ²
D2	two-dimensional diffusion	$\alpha + (1-\alpha)\ln(1-\alpha)$
D3	three-dimensional diffusion (Jander equation)	$[1-(1-\alpha)^{1/3}]^2$
D4	three-dimensional diffusion (Ginstling-Braunshtein equation)	$(1-2\alpha/3)-(1-\alpha)^{2/3}$
F1	First-order reaction	$-\ln(1-\alpha)$
R2	two-dimensional phase boundary	$1 - (1 - \alpha)^{1/2}$
R3	three-dimensional phase boundary	$1 - (1 - \alpha)^{1/3}$
A2	Avarami-Erofe'ev	$[-\ln(1-\alpha)]^{1/2}$
A3	Avarami-Erofe'ev	$[-\ln(1-\alpha)]^{1/3}$

Table S1. Common solid-state rate expressions for different reaction models[1,2]

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Fig. S1 - STEM photograph of as-prepared Ni/C and EDX of mapping data.



Fig. S2 - STEM photograph of MgH₂-6% Ni/C and EDX mapping data.



Fig. S3 - DSC profiles of MgH₂ doped with 2, 4, 6, 8%Ni/C.



Fig. S4 - XRD patterns of (a) dehydrogenated MgH₂, (b) MgH₂-6%Co/C and (c) MgH₂-6%Ni/C.



Fig. S5 - XRD patterns of rehydrogenated MgH₂-6%Co/C (a) and MgH₂-6%Ni/C (b).

References

- Zhang Y, Tian QF, Zhang J, Liu SS, Sun LX. The Dehydrogenation Reactions and Kinetics of 2LiBH₄-Al Composite. J Phys Chem C 2009;113:18424-18430.
- [2] Liu YF, Zhong K, Luo K, Gao MX, Pan HG, Wang QD. Size-Dependent Kinetic Enhancement in Hydrogen Absorption and Desorption of the Li-Mg-N-H System. J Am Chem Soc 2009;131:1862-1870.