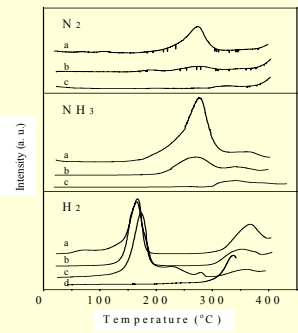
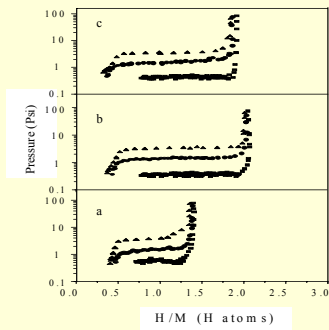


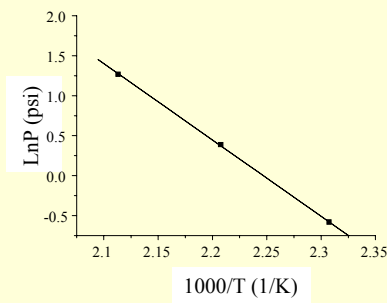
## ❖ Mg-Na-N-H system: Mg(NH<sub>2</sub>)<sub>2</sub>-NaH



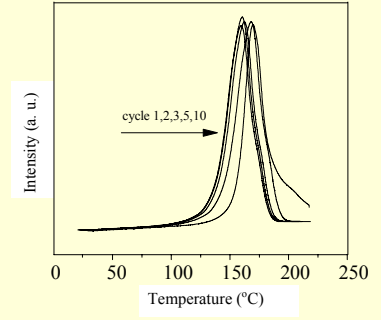
MS signals of H<sub>2</sub>, NH<sub>3</sub> and N<sub>2</sub> of Mg-Na-N-H



PCT curves of Mg-Na-N-H (a)1:1; (b)1:1.5; (c) 1:2

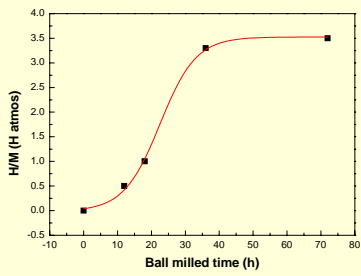


Vant' Hoff plots of sample Mg(NH<sub>2</sub>)<sub>2</sub>-1.5NaH

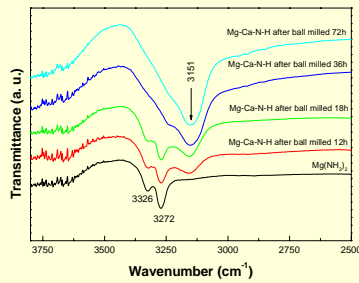


Cyclic property of Mg(NH<sub>2</sub>)<sub>2</sub>-1.5NaH

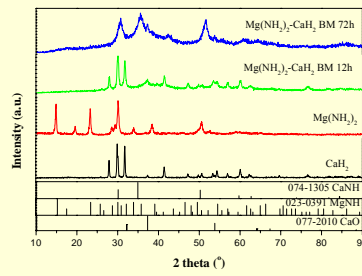
## ❖ Mg-Ca-N-H system: Mg(NH<sub>2</sub>)<sub>2</sub>-CaH<sub>2</sub>



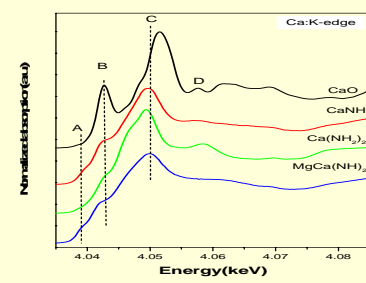
The amounts of hydrogen released during ball milling



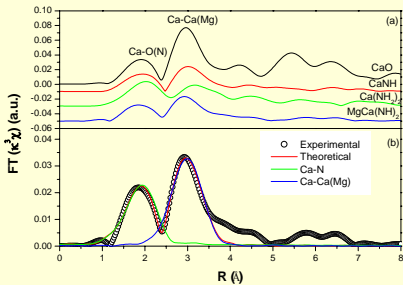
FTIR spectra of the Mg-Ca-N-H samples



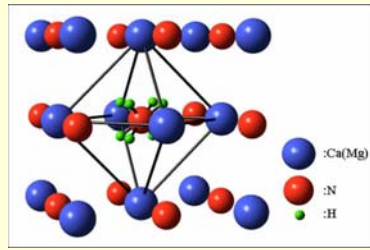
XRD patterns of the Mg-Ca-N-H samples



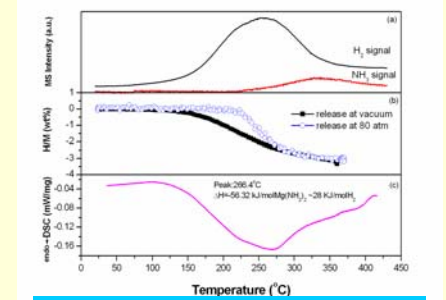
XANES Transmission Spectra at Ca K-edge



Fourier Transforms of EXAFS Spectra



Structural model of MgCa(NH)<sub>2</sub>

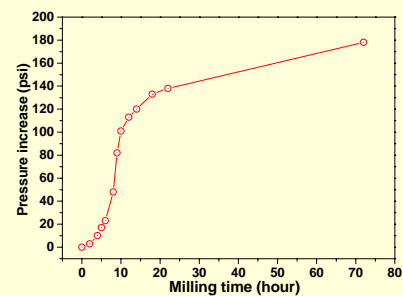


Hydrogen desorption and thermodynamic testing on the post-12h milled sample

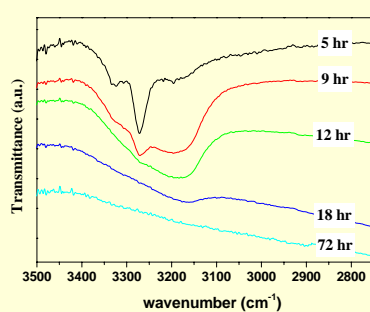
### Reaction Mechanism:



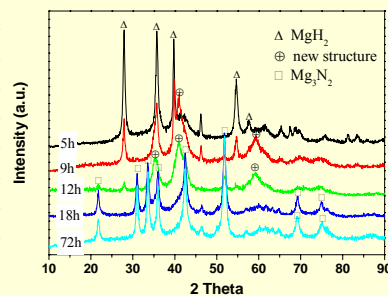
## ❖ Mg-Mg-N-H system: Mg(NH<sub>2</sub>)<sub>2</sub>-MgH<sub>2</sub>



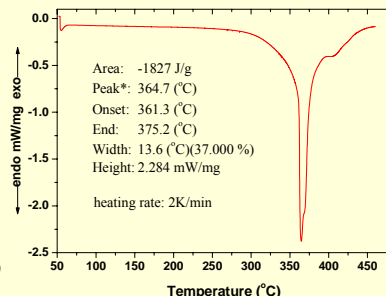
Time dependence of the hydrogen pressure in the milling jar



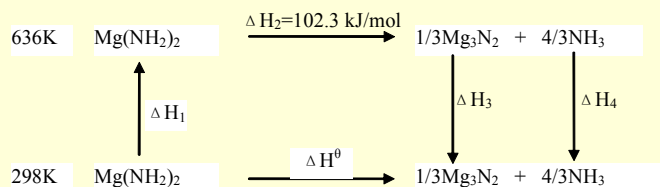
FTIR spectra of samples after ball milling



XRD patterns of samples after ball milling



DSC curve of the thermal decomposition of Mg(NH<sub>2</sub>)<sub>2</sub>



$$\begin{aligned}
 \Delta_f H^0(\text{Mg(NH}_2)_2) &= \frac{1}{3} \Delta_f H^0(\text{Mg}_3\text{N}_2) + \frac{4}{3} \Delta_f H^0(\text{NH}_3) - \Delta H^0 \\
 &= \frac{1}{3} \times (-461) + \frac{4}{3} \times (-46) - 110 \\
 &= -325(\text{kJ/mol})
 \end{aligned}$$

### Reaction Mechanism:

