

## TM-doped ZnO DMS synthesized by hydrothermal method under high magnetic field

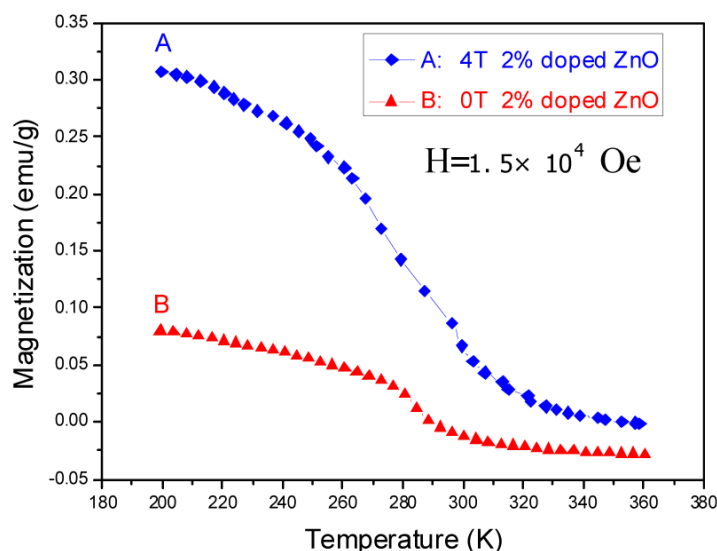
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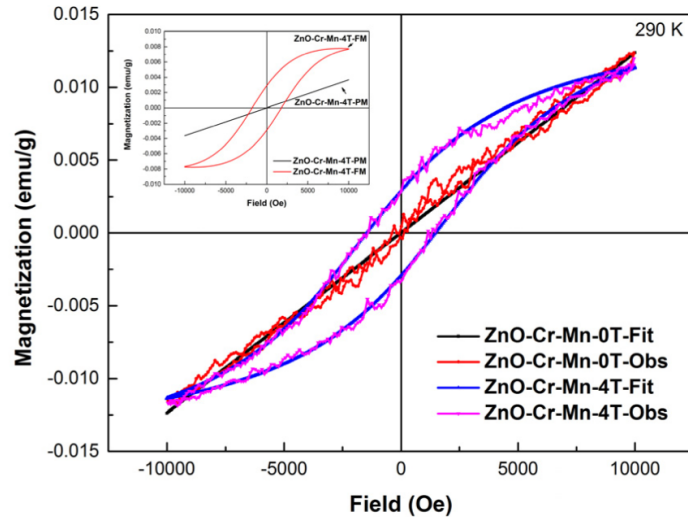
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Transition metal(TM)-doped ZnO has emerged as an attractive candidate in the quest for High  $T_C$  diluted magnetic semiconductors(DMS) which have both semiconductor and magnetic properties[1]. In our study[2,6], room-temperature ferromagnetic TM(Cr, Mn, Co, Ni,.....) doped ZnO diluted magnetic semiconductors were synthesized by hydrothermal method with 4 T pulse magnetic field-assisted. X-ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) were used to characterize the microstructure. And the HRTEM, EDS and XPS measurements ensured how many the dopant ions had incorporated into the ZnO host matrix and their states. The effects of the magnetic field on the microstructure and the magnetic properties of TM doped ZnO were studied. The experimental results show that the magnetic field could change the morphology of the crystalline ZnO and improve the amount of the dopants in ZnO DMS, curie temperature and ferromagnetism of the samples. Figure 1 is the results of magnetization dependent on the temperature under the magnetic field of  $H=1.5 \times 10^4$  Oe for 2 % Cr doped ZnO. It shows that the curie temperature increases 15 K (from 284.02 K to 299.15 K) for 4T processing sample. Figure 2 gives the M-H curves for Cr-Mn codoped ZnO which reveals the appearance of ferromagnetism resulted from the magnetic field processing.



**Fig. 1.** Temperature-dependent magnetization of 2% 0T and 2%-4T samples under  $1.5 \times 10^4$  Oe.



**Fig. 2.** M-H curves of ZnO-Cr-Mn-0T and ZnO-Cr-Mn-4T samples detected at 290 K. The inset shows the paramagnetic and ferromagnetic contributions obtained by fitting of ZnO-Cr-Mn-4T sample.

## References

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