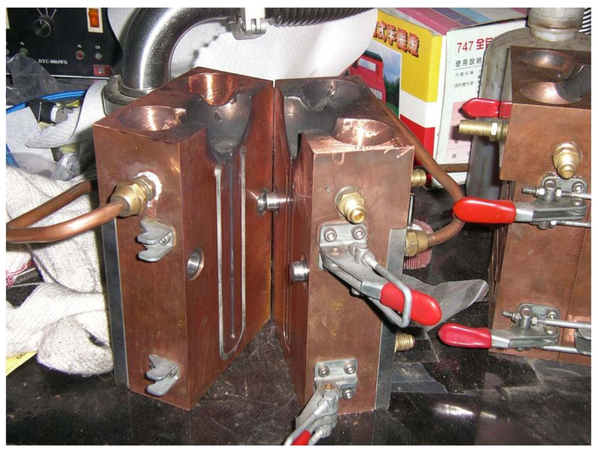
尖　端　材　料　實　驗　室

指導教授：李丕耀　教授

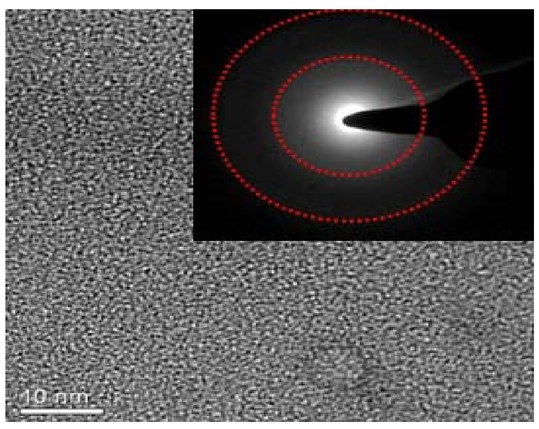
※ 簡介

本實驗室主要利用機械合金法與真空熱壓成型處理進行尖端材料之開發研究，機械合金法是利用高能量球磨機進行，製備的尖端材料以塊狀金屬玻璃及熱電材料為主，前者具優良的抗拉強度、彈性限、破壞韌性和高硬度等機械性質；在化學性質上，其均質性、無差排及無晶界特性使得表面形成的鈍化膜非常均勻且平滑，此導致形成非常均勻的鈍化膜而降低局部腐蝕的情況發生，故亦具有優良的耐蝕性；而在磁性性質方面，則具有優異的導磁率及低的矯頑磁力，而高導磁率使得金屬玻璃易被磁化。而熱電材料為一種能將熱能與電能相互轉換的材料，其優點為構造簡單、無運動部件與噪音以及其可靠性與可發展性。主要運用在加熱爐、焚化廠、汽機車等高排放廢熱的地方。

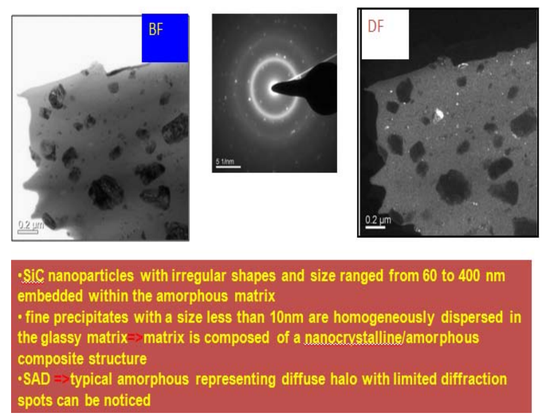


塊狀金屬玻璃吸鑄機

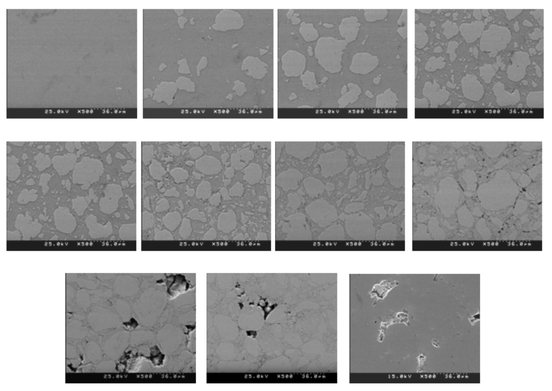
※ 成果



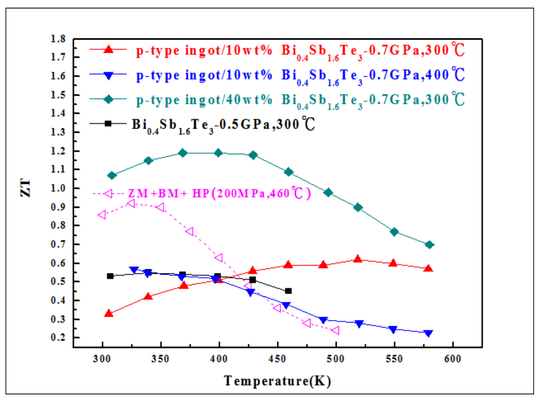
$Ti_{50}Cu_{28}Ni_{15}Sn_7$金屬玻璃粉末之TEM 影像



TEM image and SAD pattern of $Ti_{50}Ni_{15}Cu_{28}Sn_7$ BMG composite with 8 vol % SiC

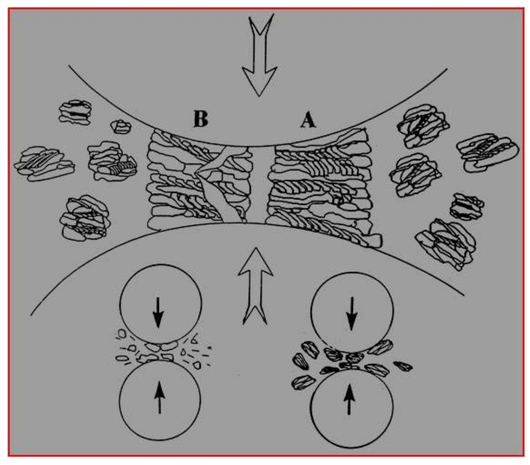


$Ti_{50}Cu_{28}Ni_{15}Sn_7/Ni_{60}Nb_{20}Zr_{20}$ 雙非晶質相金屬玻璃複合材料

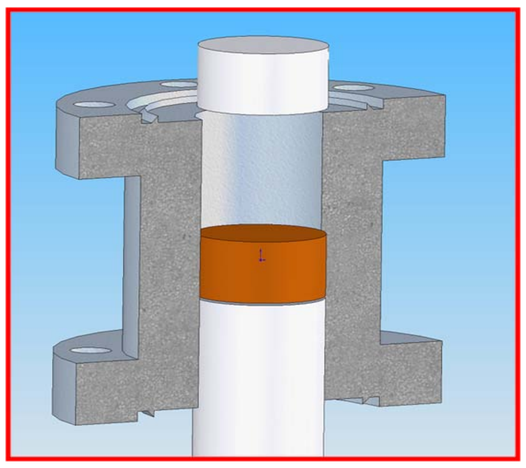


p-type 晶棒 / $Bi_{0.4}Sb_{1.6}Te_3$ 之熱壓塊材熱電優值係數隨溫度變化圖。

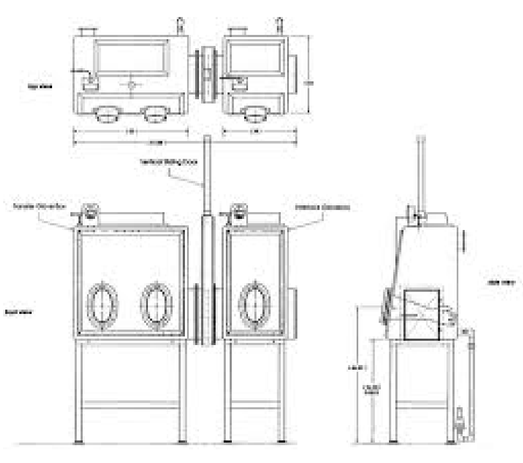
※ 實驗架構和儀器簡介



高能量震動式球磨機



60噸真空熱壓機



配置空氣純化系統之手套箱

※ 研究成果(節錄)

1. Pee-Yew Lee, Joey Hao, Tz-Yuan Chao, Jing-Yi Huang, Huey-Lin Hsieh, Hung-Chang Hsu, 2014, “Thermoelectric properties of nano-/microstructured *p*-type $Bi_{0.4}Sb_{1.6}Te_3$ powders fabricated by mechanical alloying and vacuum hot pressing”, *J. Electronic Materials*, Vol. 43, pp. 1718-1725. (SCI, IF=1.675)
2. Pee-Yew Lee, Tzu-Chien Chen, Jing-Yi Huang, Huey-Lin Hsieh, Jason Shian-Ching Jang, 2014, "Enhancement of the thermoelectric performance in nano-/microstructured p-type $Bi_{0.4}Sb_{1.6}Te_3$ fabricated by mechanical alloying and vacuum hot pressing", *J. Alloys and Compounds*, (in press). (SCI, IF=2.726)
3. Hong- Ming Lin, Chin-Yi Chen, Chien-Yie Tsay, Chih-Feng Hsu, Pee-Yew Lee*, "Microstructure and Mechanical Properties of Mechanically Alloyed Al_2O_3/ Ti-Cu-Ni-Sn Bulk Metallic Glass Composites Prepared By Vacuum Hot-Pressing", *J. Alloys and Compounds*, Vol. 504S, 2012, pp. S110-S113. (SCI & EI)
4. Chih-Feng Hsu, Wu Kai, Hong-Ming Lin, Chung-Kwei Lin, Pee-Yew Lee*, "Fabrication and Corrosion Behavior of Ti-Based Bulk Metallic Glass Composites Containing Carbon Nanotubes", *J. Alloys and Compounds*, Vol. 504S, 2010, pp. S176-S179. (SCI & EI)