



2020「中技社科技獎學金」

2020 CTCI Foundation Science and Technology Scholarship

研究獎學金 Research Scholarship

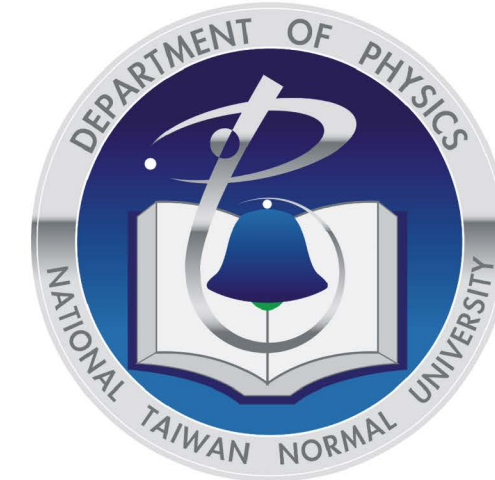


電漿誘發鐵磁薄膜磁性圖案化

Plasma-induced magnetic patterning of magnetic thin film

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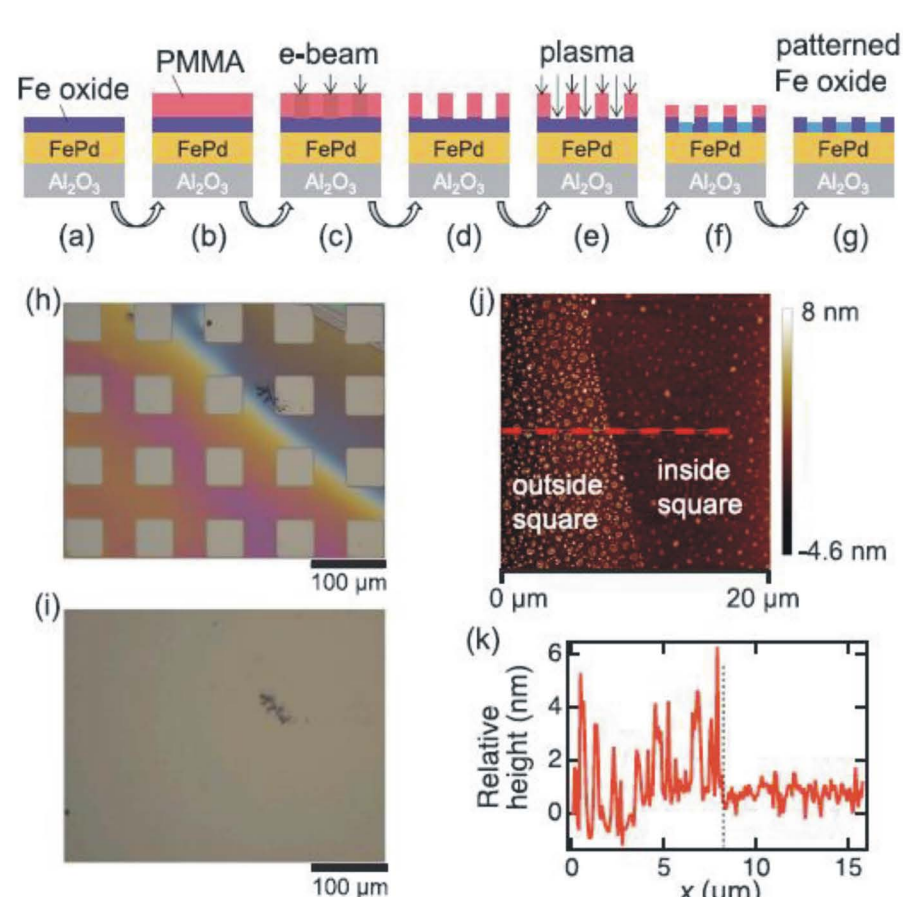


研究重點

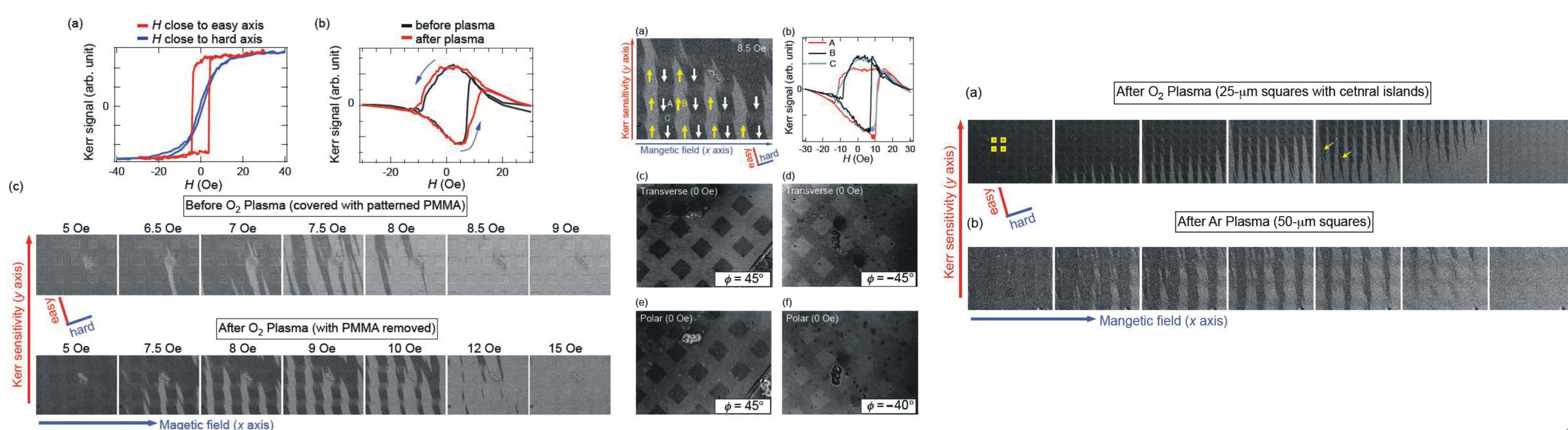
We demonstrate control of magnetic domain structures in continuous FePd thin films by patterning their surfaces with plasma treatment. The Fe-oxide layer formed on the surface upon ambient exposure of the FePd alloy thin film grown on an Al_2O_3 (0001) substrate was patterned into microstructures by e-beam lithography followed by O_2 - or Ar-plasma treatment. Microscopic pinning of magnetic domain walls in the thin films is then observed by magneto-optic Kerr effect microscopy, with the magnetic field needed to reverse the magnetization of the plasma-treated areas being larger than that for the untreated areas. An intriguing competition between the uniaxial anisotropy and the exchange bias is also observed in the system. This study demonstrates that patterning of the film surface with plasma treatment can be an easy and efficient method for sophisticated engineering of magnetic structures in thin films, and therefore has potential application in developing future data-storage and spintronic devices.

研究成果

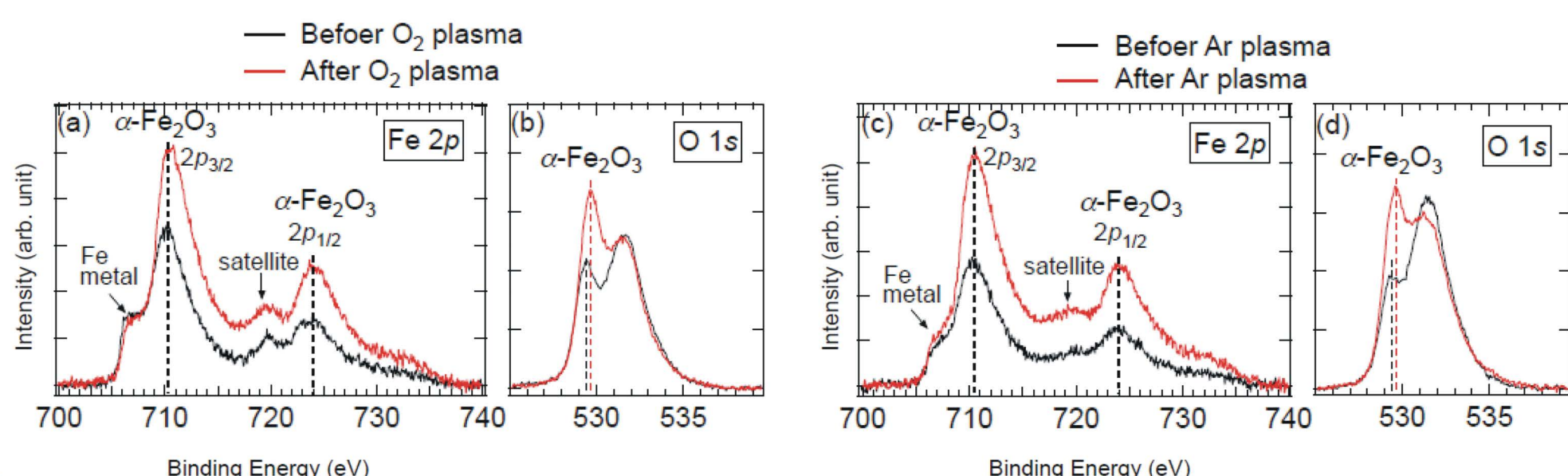
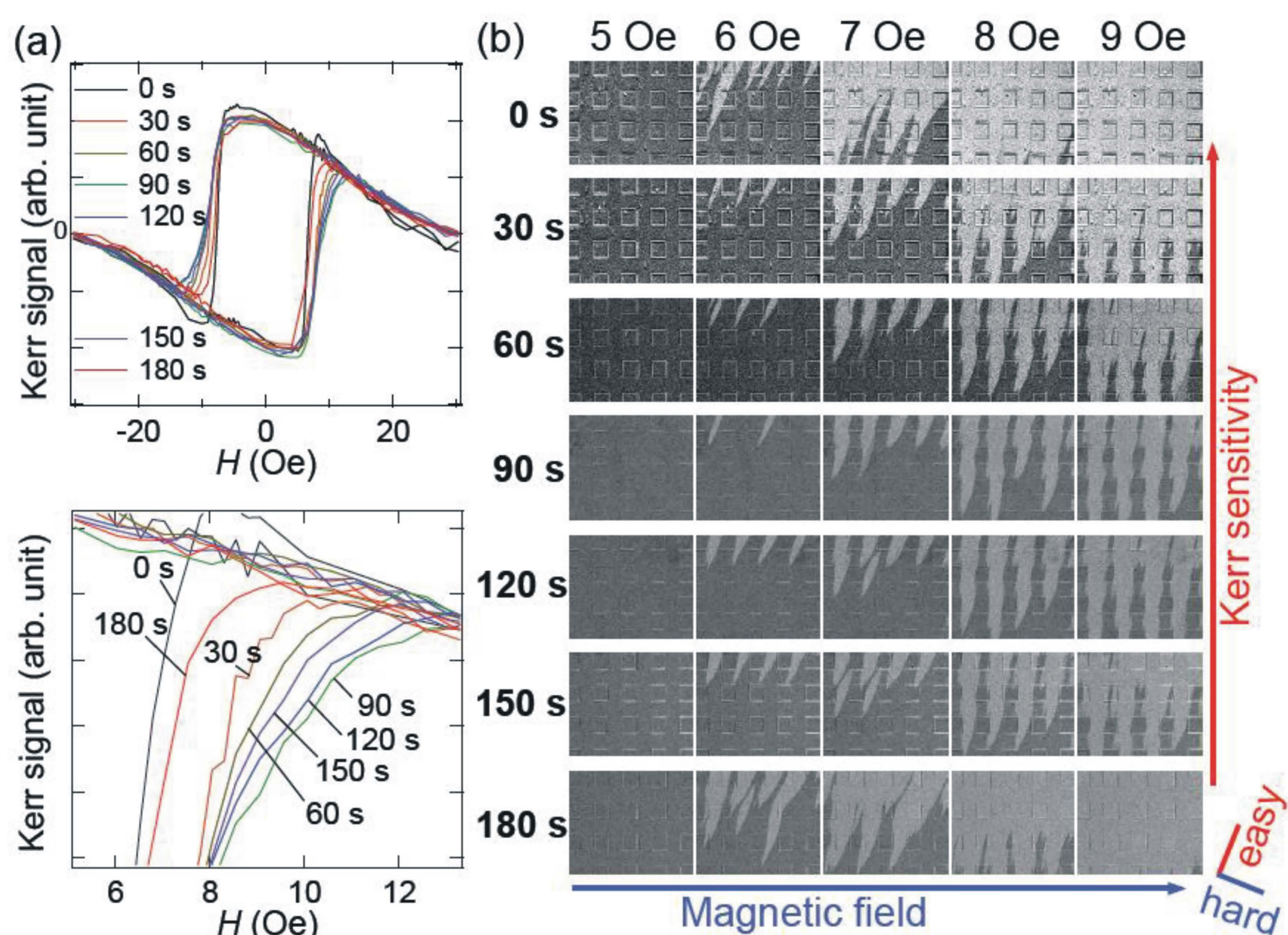
Sample preparation



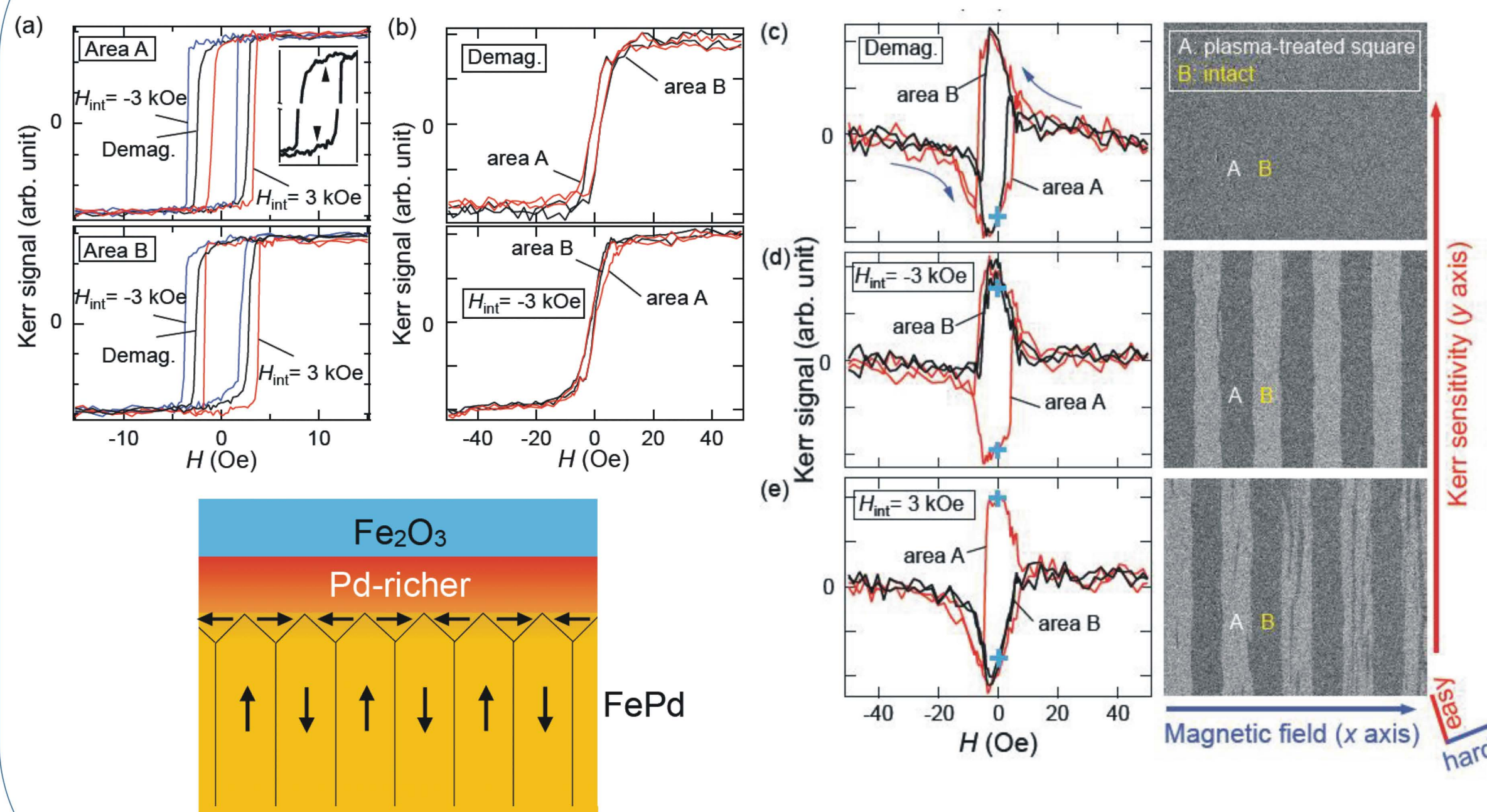
Magnetic patterning with O_2 - or Ar-plasma treatment



Effect of plasma treatment time on magnetic patterning & XPS analyses

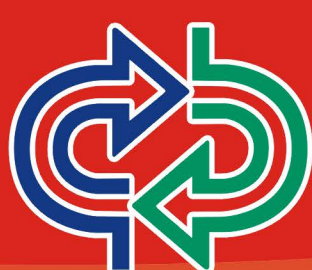


Interplay between exchange bias and uniaxial magnetic anisotropy



研究生活與心得

在研究這條路上，必須要讓自己去學習如何習慣挫折以及去接受失敗，大多數的時候會碰上儀器的損壞，量測上的錯誤，樣品製程上的失敗，這些種種不如意的事情，很多時候只能夠自己去獨立面對，但大多多的情況都是事與願違，就算面對了最後發現自己也是無能為力，這時只能說服自己去接受這樣的結果然後繼續撐下去。等到真正能夠自己獨力完成整個實驗操作流程時，緊接著又必須要思考實驗上的創新，這時就必須要博覽許多的相關的文獻從中尋求靈感或者是看有哪些題目是還沒有被發表的，若很幸運的做出了有趣的結論結果，緊接著要面對的數據上的分析以及物理上的詮釋，經歷了以上的訓練和磨練才有機會將實驗結果發表成論文。最後我想感想家裡對於我在求學時經濟上的援助以及江佩勳教授和林文欽教授的指導才讓我有機會獲得這個獎項。



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