台灣顯微鏡學會

第三十八屆學術研討會　107年8月26日　中國醫藥大學附設醫院

主辦單位:台灣顯微鏡學會

協辦單位: 中國醫藥大學附設醫院-病理部

顯微鏡學會 38 屆年會暨學術大會

議程表

◆ 課程時間：107 年 08 月 26 日(星期日) 08：30 ~17:30

◆ 課程地點：中國醫藥大學附設醫院癌症大樓一樓（階梯教室）

課程時間	講　題	講　者	座長
0830	報到		
0930-0940	開幕式暨貴賓致詞	周德陽教授院長	王約翰理事長
0940-1020	2D, 3D and Correlative Scanning Electron Microscopy for the Life Sciences	Dr. Ruth Redman	王約翰理事長
1020-1100	TEM Investigation of the Structure for Nano-Steels	楊哲人教授	李志浩教授
1100-1140	會員大會 討論提案 1. 補正內政部函報: 105 年度收支決算表及資產負債表之餘絀不符 2. 106 年度收支決算表等 3. 107 年度預算表 4. 108 年第四屆東亞顯微鏡國際研討會 EAMC4 大會籌備報告 5. 學會網頁及 EAMC4 網頁建置		王約翰理事長
1140-1300	午餐	H 棟 B1 美食廣場	
1300-1400	壁報口頭報告及攝影比賽	投稿者	陳志遠教授
1400-1425	Application of transmission electron microscopy in pathology diagnosis 電顯在病理的應用	王志生教授	許秋容教授

1425-1450	Electron microscopy in the diagnosis of medical diseases of the kidney 電顯在腎臟病理的應用	趙載光教授	王約翰教授
1450-1515	生技細胞治療研究應用與展望 The Future Application of Microscopy in Cancer Cell Therapy Research	詹佳穎教授	鮑忠興博士
1515-1540	休息		
1540-1605	Effects of Heat Treatment on Yoke 8625M HSLA Steel	林新智教授	楊哲人教授
1605-1630	Atomic resolution structural characterization of Nephrite by aberration-corrected STEM	蕭健男博士	羅聖全理事
1630-1655	Ultrathin specimen preparation by a focued, low-energy Ar-ion milling method	李威志博士	蘇紘儀理事
1700-1720	頒獎及閉幕	薛景中教授	王約翰理事長

台灣顯微鏡學會第 18 屆理監事名錄

職　　稱	姓　　名	服務單位
理事長	王約翰（博士）	中國醫藥大學附設醫院病理部
常務理事	楊哲人(教授)	台灣大學材料科學工程學系
常務理事	陳香君(教授)	台灣大學生命科學系
常務理事	劉康庭(先生)	友聯光學股份有限公司
常務理事	薛景中(博士)	台灣大學材料系
	朱明文(研究員)	台灣大學凝態中心
	蘇紘儀(博士)	台灣積體電路有限公司
	陳金富(先生)	捷東股份有限公司
	李志浩(教授)	清華大學工程與系統科學系
	謝詠芬(博士)	閎康科技股份有限公司
	溫政彥（教授）	台灣大學材料系
	羅聖全（博士）	工業技術研究院材料與化工研究所
	張　立(教授)	交通大學材料科學與工程學系
	劉全璞(教授)	成功大學材料科學與工程系
	簡萬能(博士)	中央研究院植物暨微生物學研究所
候補理事	江振誠（先生）	國家同步輻射研究中心
	章為皓(博士)	中央研究院化學研究所
	鄭貽生(教授)	台灣大學植物科學研究所
	孫啟光(教授)	台灣大學電機工程學系
	陳福榮(教授)	清華大學工程與系統科學系
常務監事	曾傳銘(博士)	明智科技大學材料系
監事	顏鴻威（教授）	台灣大學材料科學與工程學系
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	鮑忠興(博士)	宜特科技股份有限公司
	周苡嘉(教授)	交通大學物理系
候補監事	許秋容（教授）	中興大學生命科學系
	陳志遠（教授）	國立臺北科技大學智慧財產權研究所

台灣顯微鏡學會　　公告　107 顯字第 1070002 號

事由：107 年會員年會暨學術大會

時間：107 年 8 月 26 日上午 0830 至下午 1730 (敬備午餐)

地點：台中市北區五義街 120 號
中國醫藥大學附設醫院研症中心大樓一樓階梯教室（I 棟)

會員大會：

1. 會務報告提案討論及年度預算決算
2. 2019(108 年) EAMC4 第四屆東亞顯微鏡大會籌備報告

徵稿：即日起至 8 月 10 日截稿

1. 學術論文發表
2. 壁報發表暨評比競賽
3. 攝影圖片評比競賽

交通訊息：請自行上網查詢，多路公車到達，台中使用悠遊卡 10 公里免費

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TEM Investigation of the Structure for Nano-Steels

Jer-Ren Yang (楊哲人)*

Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

*jryang@ntu.edu.tw

Steel has the ability to adapt to changing requirements. This comes from the tremendous ways in which its structure can be influenced by processing and alloying. The advances in materials science allow novel steel designs, and newly-developed steels with striking mechanical properties are eagerly expected. In this presentation, firstly, a review for the phase transformations of steels with the corresponding product crystal morphologies will be delivered. Then, TEM investigation of two case studies for nano-steels will be addressed.

The first case study deals with interphase-precipitated nanometer-sized carbides in the ferrite matrix for the development of advanced dual-phase steels for automobile application [1]. During the transformation from austenite to ferrite, the carbides nucleated densely on the austenite/ferrite interface, which then moved to a new position, where the nucleation cycle again occurred. This process can be repeated many hundreds of times, thereby leading to a very fine banded dispersion of carbides in the ferrite matrix (as shown in Fig. 1) The strength of the steels is remarkably enhanced by introducing interphase-precipitated nanometer-sized carbides.

The second case study deals with TEM investigation of severe deformation structures of the nanostructured bainitic steel. This newly advanced armor steel mainly consists of nanometer-sized bainitic ferrite subunits with thin-film austenite and blocky austenite. For the purpose of exploring the mechanical behaviour and microstructure evolution of nanostructured bainite under deformation at high strain rates ($>10^3$ s^{-1}), split Hopkinson pressure bar experiments were conducted. TEM revealed that nanometer-sized twinning occurred in both blocky austenite and film austenite [2]. In the first stage, multiple variants of mechanical twinning occurred in the blocky austenite (as shown in Fig.2), providing a superior work-hardening capacity. In the later stage, the single variant of lamellar twinned structures formed in the film austenite (as shown in Fig. 3), promoting further straining.

References

1. S. P. Tsai, S, C. H. Jen, H. W. Yen, C. Y. Chen, M. C. Tsai, and J. R. Yang, Materials Characterization 123 (2017) 153-158.

2. Y. T. Tsai, C. R. Lin, W. S. Lee, C. Y. Huang, and J. R. Yang , Scripta Materialia 115 (2016) 46-51

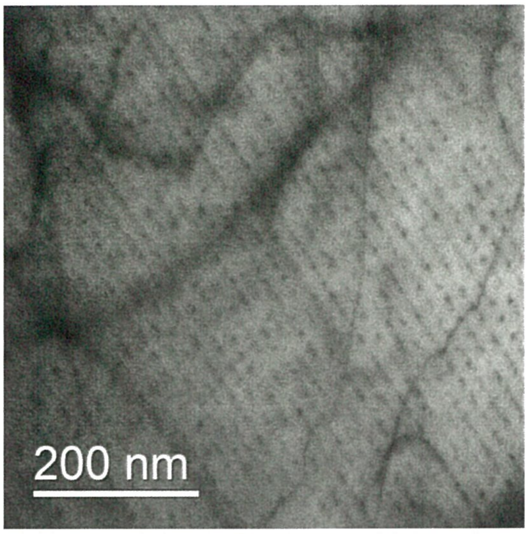

Fig. 1 TEM micrograph of the interphase-precipitated carbides in ferrite matrix.

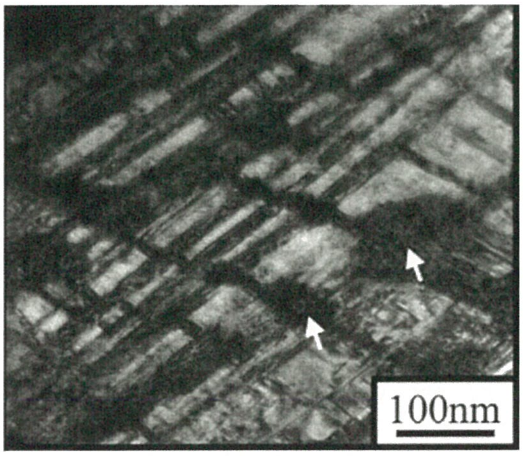

Fig. 2 Multi-variant twinned structures and α' martensite (as indicated by arrows).

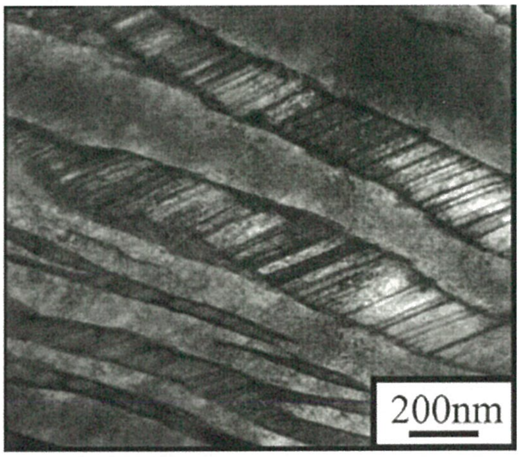

Fig. 3 Single variant of lamellar twinned structures in film austenite.

臺灣顯微鏡學會
收支決算表
中華民國105年1月1日至105年12月31日

款	項	目	名稱	決算數	預算數	決算與預算比較數 增加	決算與預算比較數 減少	說明
1			**經費收入**	**380000**	**270000**	110000		
	1		入會費　年費	50000	60,000		10000	
	2		其他收入	326000	200,000	140000		
	3		利息收入	4,000	10,000		6000	
2			**經費支出**	**145966**	**216,000**		70034	
	1		辦公費	116766	196,000		79234	
		1	文具費	1400	5,000		3600	
		2	郵電費	446	2,000		1554	
		3	業務推展支出	90420	101,000		10580	
		4	印刷費	24500	88,000		63500	
	2		臨時工資	29200	20,000	9200		
3			提列準備基金	**0**	**0**			
4			**本其餘絀**	234034	54000	180034		

理事長：　　常務監事：　　秘書長：

臺灣顯微鏡學會

資產負債表

民國 105 年 1 月 1 日至 105 年 12 月 31 日

資產		負債、基金暨餘額	
科目	金額	科目	金額
流動資產		流動負債	
庫行存款（現金）	319,554	短期借款	
銀行存款	1,023,724	應付票款	
有價證券		應付款項	
應收票據		代收款項	
應收款項		預收款項	
短期墊款		固定負債	
預付款項		長期借款	
固定款項		其他負債	
土地		存入保證金	
房屋及建築		雜項負債	
事務器械		基金	
儀器設備		提撥基金	
交通運輸設備		餘絀	1,343,278
雜項設備		累積餘絀	1,109244
其他設備		本期餘絀	234,034
存出保證金			
雜項資產			
合計	1,343,278	合計	1,343,278

理事長：　　常務監事：　　秘書長：

臺灣顯微鏡學會

106年收支決算表

中華民國106年1月1日至106年12月31日

科目				決算數	預算數	決算與預算比較數		說明
款	項	目	名稱			增加	減少	
1			**經費總收入**	**828200**	270000	558200		
	1		入會費 年費	31500	60000		28500	
	2		其他收入	792700	200000	592700		
	3		利息收入	4,000	10000		6000	
2			**經費總支出**	**576730**	415000	161730		
	1		辦公費	245718	395000		105600	
		1	文具費	0	5000		5000	
		2	郵電費	1325	2000		675	
		3	業務推展支出	172357	300000		83961	
		4	印刷費	72036	88000		15964	
	2		臨時工資		20000		20000	
3			基金及設備	331012	0	287330		
4			**本期餘絀**	251470	-145000	396470		

理事長： 常務監事： 秘書長：

臺灣顯微鏡學會
現金出納表

民國 106 年 1 月 1 日至民國 106 年 12 月 31 日止

收入		支出	
科目名稱	金額	科目名稱	金額
上期結存	1,277,760	本期支出	245,718
本期收入	828,200	本期結存	1,860,242
合計	2,105,960	合計	2,105,960

理事長：　　　常務監事：　　　秘書長：

臺灣顯微鏡學會

資產負債表

民國 106 年 1 月 1 日至 106 年 12 月 31 日

資　產		負債、基金暨餘額	
科　目	金　額	科　目	金　額
流動資產		流動負債	
庫行存款（現金）		短期借款	
銀行存款	1,860,242	應付票款	
有價證券		應付款項	
應收票據		代收款項	
應收款項		預收款項	
短期墊款		固定負債	
預付款項		長期借款	
固定款項		其他負債	
土地		存入保證金	
房屋及建築		雜項負債	4,346
事務器械		基金及設備	331,012
儀器設備		提撥基金及設備	331,012
交通運輸設備		餘絀	1,594,748
雜項設備		累積餘絀	1,343,278
其他設備	69,864	本期餘絀	251,470
存出保證金			
雜項資產			
合計	1,930,106	合計	1,930,106

理事長：　　　常務監事：　　　秘書長：

臺灣顯微鏡學會

107 年收支預算表

中華民國 107 年 1 月 1 日至 107 年 12 月 31 日

科目				預算數	上年度決算數	本上年度決預算比較數		說明
款	項	目	名稱			增加	減少	
1			**經費總收入**	**985500**	**828200**	157300		
	1		常年會費及入會費	31500	31500	0		
	2		贊捐助收入	950000	785000	165000		
		1	公司贊助	800000	785000	15000		
		2	政府及其他機構之補助款	0	7700		7700	
		3	會員捐贈	150000	0	150000		
	3		利息及其他收入	4000	4000	0		
2			**經費總支出**	**680107**	**576730**	103377		
	1		辦公費	92000	59581	32419		
		1	文具費、郵電費	2000	1325	675		
		2	理監事聯席會場地及聚餐	70000	58256	11744		
		3	國內差旅費	20000	0	20000		
	2		業務推展及教育支出	475000	308416	166584		

		1	年會場地租金及布置費用	30000	30850				850		
		2	年會印刷及專案費	70000	72036				2036		
		3	臨時工資	20000	115200				95200		
		5	公關費	5000	3000		2000				
		6	雜項	150000	87330		62670				電腦設備 87330 網頁 150000
		7	國際差旅及報名費	200000			200000				
	3		基金提列								
		1	網頁建構		100000				100000		
		2	第四屆東亞電顯大會	100000	100000		0				
	4		折舊攤提	13107	8733		4374				
3			資產及負債	2231125	1938839		292286				
	1		本期餘絀	305393	251470		53923				
	2		前期餘絀	1660242	1408772		251470				
	3		基金	200000	200000		0				
	4		其他	65490	78597				13107		電腦設備殘值

理事長：　　　　常務監事：　　　　秘書長：　　　　秘書

Title

Application of transmission electron microscopy in pathology diagnosis

王志生教授
高雄榮民總醫院病理檢驗部

Abstract

Transmission electron microscopy (TEM) plays importantv role in pathology diagnosis. Some morphology alterations can only be identified by TEM, such as glomerular podocyte footprocess fusion in podocytopathy, thin basement membrane nephropathy and Alport nephritis, GBM change in metobolic syndrome, absence of podocyte slit diaphragm in congenital nephrotic syndrome, as well as deficient myosin in critical illness myopathy. Some minor change observed in light microscope may need confirmation by TEM, such as early amyloidosis involving the glomerulus. Others may have characteristic ultrastructural changes that help in daily pathology diagnosis, such as imme complex type electron dense deposits, powdery deposits in light chain deposition disease, collagen type III glomerulopathy and igts differential diagnosis from Nail-Patella syndrome. We will present the cases showing the application of TEM in the pathology diagnosis. (Jyh-Seng Wang)

Electron microscopy in the diagnosis of medical diseases of the kidney

趙載光 Tai-Kuang, Chao
三軍總醫院病理部主任醫師　副教授

One of the first uses of electron microscopy (EM) in medicine was in renal disease. Tissue should be properly fixed for possible EM in all biopsy samples of native kidneys. The most important role of EM in a diseased glomerulus is the search for discrete electron-dense “immune-type” deposits. In immune-mediated glomerular disease, EM is useful for determining the presence and the exact site of the deposits, which is often difficult to determine by immunofluorescent examination, especially if deposits are along the glomerular capillary wall (subendothelial versus subepithelial). In certain diseases such as SLE, the presence of glomerular subendothelial deposits indicates a more severe disease. Glomerular mesangial deposits are present in a number of diseases such as SLE, IgA nephropathy, and others. Occasionally it is possible to make a specific diagnosis by EM, as in Alport’s hereditary nephropathy with characteristic diffuse splitting, splintering, rarefaction, and thinning of the GBMs.

生技細胞治療研究應用與展望

The Future Application of Microscopy in Cancer Cell Therapy Research

Chia-Ing Jan[1,2], John Wang[2,3]

1. Division of Molecular Pathology, Department of Pathology, China Medical University Hospital
2. Department of Pathology, China Medical University Hospital
3. Division of Forensic Pathology, Department of Pathology, China Medical University Hospital

Abstract:

Cancer immunotherapy exploits the properties of immune specific cells, for example dendritic cells (DCs), which are professional antigen-processing and -presenting cells to induce antigen-specific antitumor responses. DC-based therapies employ cytotoxic T lymphocytes (CTLs), natural killer cells, and cytokines to directly or indirectly kill tumor cells. Recent studies have demonstrated the feasibility, safety, and bioactivity of autologous DC vaccines for GBM treatment, even in the case of recurrent tumors. In the past five years, adoptive cell therapy (ACT) is among the latest progressions in immunotherapy. One encouraging method of the ACT is the adoptive transfer of genetically engineered T cells to express chimeric antigen receptor (CART cells equipped with chimeric antigen receptors (CAR T cells). CART cells have recently provided promising advances as a novel immunotherapeutic approach for cancer treatment. CAR T cell therapy has shown stunning results especially in B-cell malignancies.

Deciphering the complexity of tumor-immune cell interactions and response of tumor and tumor microenvironment to immunotherapeutic T cells, NK cells or DCs rely heavily on microscopy. In this brief presentation, we will demonstrate the utilization of various kinds of microscopic experiments in interpreting live immune cell to live tumor cell interactions and histologic sections of changes of tumor cells and tumor microenvironment in patients receiving immunotherapy.

材料物理組 Invited speakers

Effects of Heat Treatment on Yoke 8625M HSLA Steel

H.C. Lin (林新智)[1*], Y.T. Hsu (徐宇彤)[1], H.Y. Jiang (江和穎)[1], H.W. Yen (顏鴻威)[1], Steven Hong (洪榮德)[2*]
[1]Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan
[2]Yoke Industrial Corporation, Taichung, Taiwan
[*]hclinntu@ntu.edu.tw

Yoke 8625M steel, newly developed by Yoke Industrial Corporation for high-grade lifting components, belongs to an advanced high strength low alloy steel. By appropriate addition of Mn, Cr, Mo, Ni elements, the Yoke 8625M alloy steel can exhibit excellent mechanical strength, toughness and hardenability. The present study aims to investigate the effects of heat treatment on the Yoke 8625M alloy steel, including the microstructure, hardenability, mechanical strength and impact toughness. Meanwhile, the Yoke 8625M alloy steel might be susceptible to hydrogen-induced embrittlement, which will reduce the strength and toughness of the materials, inducing severe fracture during the practical applications. In this research, the effects of tempering on the hydrogen-induced embrittlement of Yoke 8625M alloy steel will also be reported.

References

1. Q. Liu and A. Atrens, Corrosion Reviews, **31**, 3 (2013).
2. B.A. Szost, R.H. Vegter and P.E.J. Rivera-Dı´az-del-Castillo, Metall. and Mater. Trans. A, **44**, 4542 (2013).

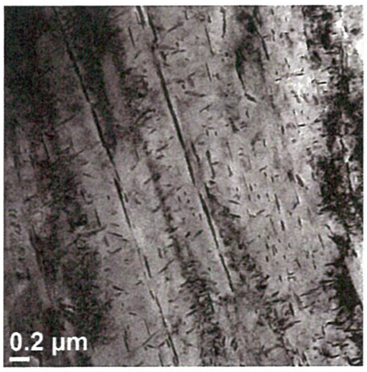

Figure 1. TEM observation of Yoke 8625M alloy steel with tempering at 300°C.

Discipline: ____Biology and Biomedical science or____Physics and Materials Science.

台灣顯微鏡學會 Microscopy Society of Taiwan

材料物理組 Invited Speaker

Atomic resolution structural characterization of Nephrite by aberration-corrected STEM

Tsai-Fu, Chung (鍾采甫)[1], Jong-Shing Bow (鮑忠興)[2], Chien-Nan Hsiao (蕭健男)[3], Jer-Ren Yang (楊哲人)[1]

[1] Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

[2] Integrated Service Technology INC., Hsinchu, Taiwan

[3] Instrument Technology Research Center, National Applied Research Lab, Hsinchu, Taiwan

The atomic structure of Nephrite was investigated using an aberration-corrected scanning transmission electron microscope (aberration-corrected STEM) with energy distribution spectrometer. Also, the influence of various aberration coefficients such as defocus, astigmatism, coma, spherical aberration and star aberration on the shape of the probe and more importantly on the electron intensity distribution within the probe was calculated. The accuracy required for compensation of the various aberration coefficients to achieve sub-angstrom resolution with the electron optics system was evaluated by the calculation of phase shift. It was found that Nephrite would be characterized as the amphiboles groups belonging to monoclinic structures. This mineral material is mainly composed of the mixed calcium and magnesium silicate[1], easily subjected to the radiation damage from electron beam of microscopy[2]. Moreover, from transmission electron microscopy (TEM) images, the high density of stacking faults within these grains would indicate that defects would not vanish as the jade-forming under the extremely high temperature. Particularly, along the specific zone axes, the atomic-scale arrangements of Nephrite would be explored by high-resolution transmission electron microscopy (HRTEM). Furthermore, the Z-contrast high angle annular dark field (HAADF) image of Nephrite was revealed by aberration-corrected scanning transmission electron

microscopy, as shown in Figure 1. Figure 1 (b-d) the enlarged white-dotted frame of (a) showing the corresponding diffraction pattern and the HAADF-STEM images. ((d) is subjected to noise suppressed process)

References

[1] J.M. Thomas, P.A. Midgley, High-resolution transmission electron microscopy: the ultimate nanoanalytical technique, Chem. Commun. (11) (2004) 1253-1267.

[2] R. Egerton, P. Li, M. Malac, Radiation damage in the TEM and SEM, Micron 35 (2004) 399-409.

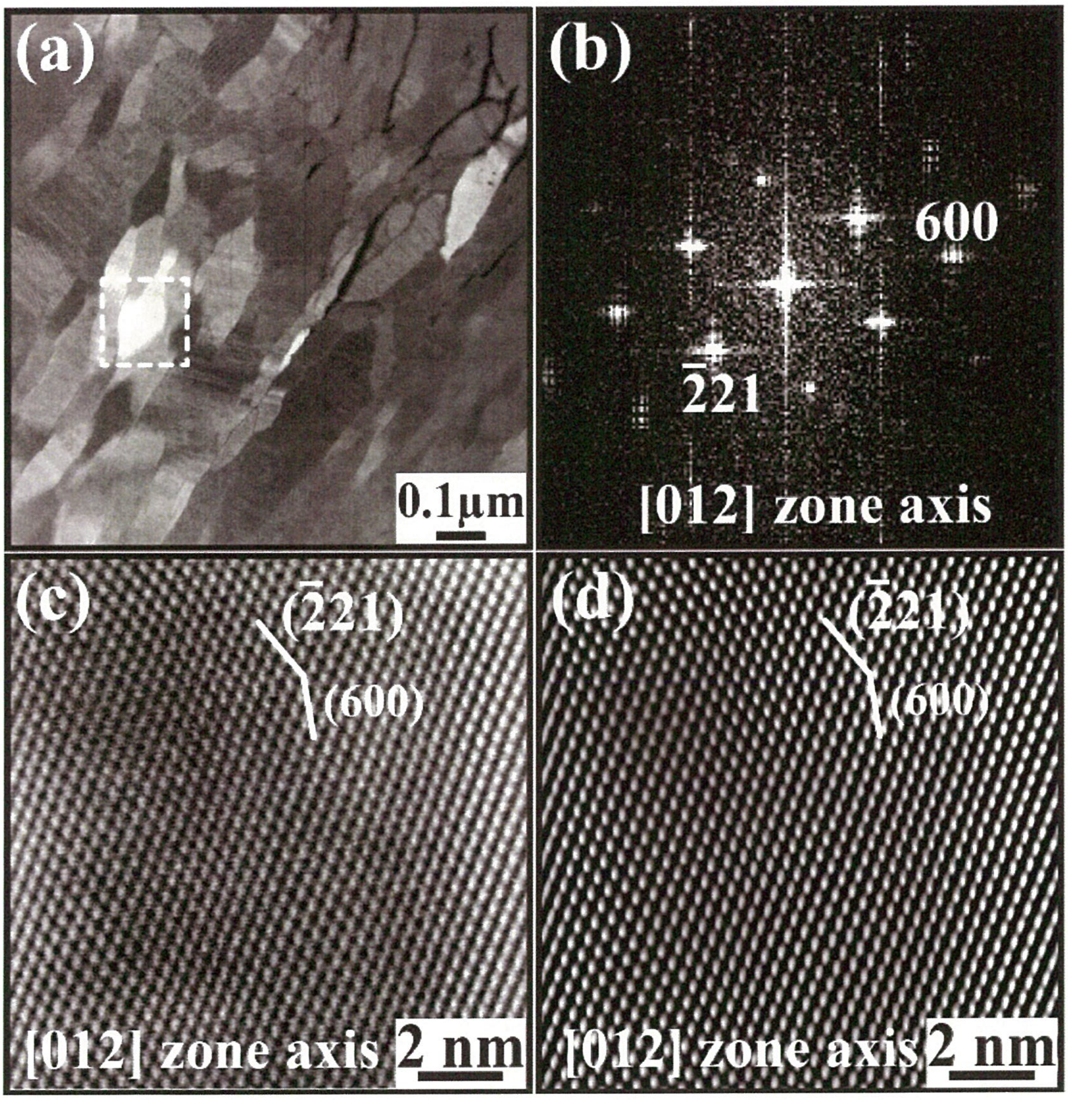

Figure 1 (a) the elongated grains of Nephrite. (b-d) the enlarged white-dotted frame of (a) showing the corresponding diffraction pattern and the HAADF-STEM images. ((d) is subjected to noise suppressed process)

台灣顯微鏡學會
Microscopy Society of Taiwan

材料物理組 Invited speakers

Ultrathin specimen preparation by a focued, low-energy Ar-ion milling method

Wei-Chih (Richard) Li (李威志)
E.A. Fischione Instruments, Inc.
*richard_li@fischione.com

The low-energy Ar-ion milling method was used to prepare ultrathin specimens for TEM/STEM observation. The variable energy ion source generates ion energies as low as 50 eV. In addition, the beam size is as small as 1 μm at higher energies, which enables the removal of amorphization, implantation, or redeposition from targeted areas. The presentation is going to show results which are in cooperation with our customers in Taiwan. It is expected to deliver the new technology to users who are devoted to the field of advanced analytics technologies.

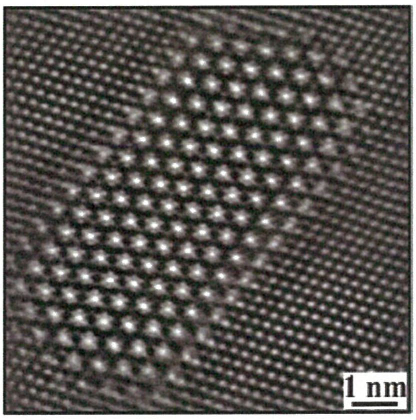

Figure caption. Under $[110]_{Al}$ zone, the cross-section of η_1 precipatates in the AA7050 aluminium alloy provided the information of the crystal beauty. The TEM specimens were twinjet electropolished. To remove the oxidation layer introduced by the electrochemical process and further reduce sample thickness, the TEM foils were thinned by focus argon beam technique (using M1040 NanoMill, E.A. Fischione Instruments).

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第三十八屆台灣顯鏡學會年會研討會

論文海報競賽

A-01

The study of oriented silicon nitride crystals formed by nitridation of ion-implanted silicon wafer

Thi-Hien Do (杜氏賢), 1 Yu-Cheng Chen (陳佑丞),1 and Li Chang (張立)1*

1Department of Materials Science and Engineering, National Chiao Tung University, Hsinchu, Taiwan

A-02

Fe 3O4 中空微米球之製備與結構分析

黃鈺方 1,2 蔡任豐 2 徐培凱 1 黃文岐 1 陳詩芸 1* 羅聖全 2

1 國立台灣科技大學材料與工程系 2 工業技術研究院材料與化工研究所

A-03

Kinematic Study of Growth Mechanism of ZnO thin film during-oblique angle deposition using transmission electron microscopy and XRD

Chiao-Yen Wang (王喬彥), 1 and Chuan-Pu Liu (劉全璞)1*

1Department of Materials Science and Engineering, National Cheng Kung University, Tainan, Taiwan

A-04

Development of special SEM stage for environment sensitive materials investigation

Shih-Yi Liu (劉鈰誼), 1 Yu-Fang Haung (黃鈺方) , 1 Chun-Wei Haung (黃浚瑋) , 1 Cheng-Yu Hsieh (謝承佑) , 1and Shen-Chuan Lo (羅聖全)1*

1Dept. of Electron Microscopy Development & Application, Industrial Technology Research Institute, Hsinchu, Taiwan

A-05

Growth mechanism of titanium germanosilicide on an epitaxial interface of Ti/SixGe1-x

Jit Dutta 傑度達, Yu-Liang Hsiao, Kapil Gupta, and Chuan-Pu Liu*

Department of Materials Science and Engineering, National Cheng Kung University, Tainan 701, Taiwan

A06

Two-step isothermal transformation in carbide-free bainite

莊庭牧

國立台灣大學

A07

On STEM Observations of HfN/HfSi2 Interface

Yu-Siang Fang (方鈺翔)*, Kun-An Chiu (丘坤安), Thi Hien Do (杜氏賢), and Li Chang**(張立)

Department of Materials Science and Engineering, National Chiao Tung University, Hsinchu, Taiwan, ROC.

A08

Nucleation mechanisms of precipitates in the AA7050 aluminium alloy by HRTEM and HAADF-STEM investigations

Tsai-Fu Chunga, Yo-Lun Yangb, Chien-Nan Hsiaoc, Wei-Chih Lid, Jer-Ren Yanga

Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

Department of Mechanical Engineering, Imperial College London, London SW7 2AZ, UK

Instrument Technology Research Center, National Applied Research Lab, Hsinchu, Taiwan

E.A. Fischione Instruments, Inc., 9003 Corporate Circle, Export, PA 15632, U.S.A.

Fe_3O_4中空微米球之製備與微結構分析

黃鈺方[1,2] 蔡任豐[2] 徐培凱[1] 黃文岐[1] 陳詩芸[1*] 羅聖全[2]

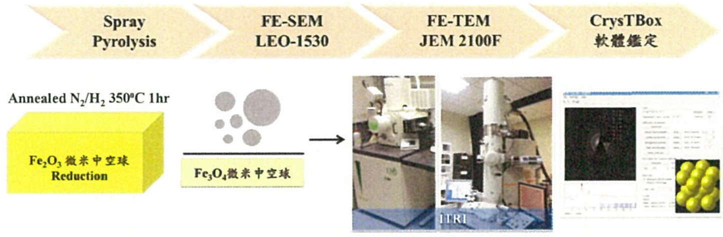
[1]國立台灣科技大學材料科學與工程系 [2]工業技術研究院材料與化工研究所

摘要

微米尺寸之Fe_3O_4中空球的應用範圍很廣，包括生物分離、藥物釋放以及觸媒等領域。為開發一較簡易的製程，並建立控制微米結構相關製程參數，本研究以噴霧熱裂解法進行Fe_2O_3微米中空球之製備，再經還原反應形成微米級Fe_3O_4中空球。樣品的形貌及結構以FE-SEM以及FE-TEM進行詳細地分析。本研究成果提供完整之Fe_3O_4中空球結構資訊，提供未來材料開發之依據。

實驗流程

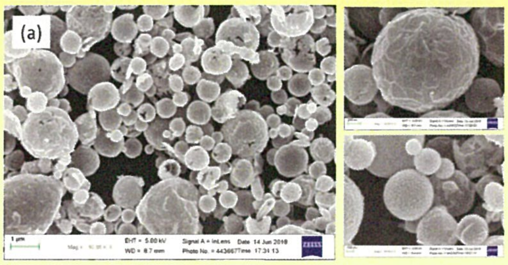
本研究以噴霧裂解法製作Fe_3O_4中空顆粒，導入管型氣氛爐中，接續進行400°C氫氬還原所製得微米級Fe_3O_4中空球，實驗以掃描式電子顯微鏡及穿透式電子顯微鏡觀察製備出的中空Fe_3O_4顆粒形貌與繞射圖譜鑑定其晶體結構。

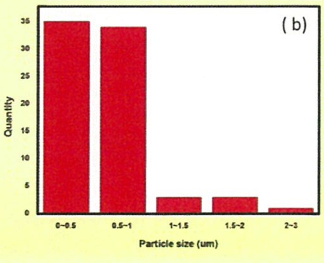


FE-SEM及FE-TEM檢測儀器為工業技術研究院材化所電鏡技術開發實驗室協助提供。

結果與討論

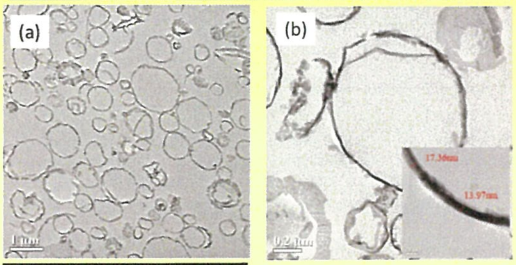
SEM表面形貌觀測

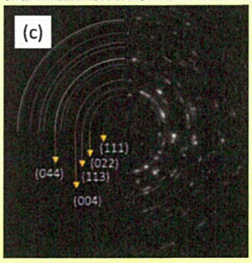




SEM影像觀察結果，看出Fe_3O_4微米中空球體具有不同比面特徵及大小顆粒，尺寸約介於0.17-2.6 um，平均尺寸約為0.62 um。

TEM微結構分析及繞射鑑定





製備TEM截面樣品進行分析，其結果如圖(b)所示，證實其為中空球殼結構，且其殼層厚度約為13-18nm，TEM選區繞射圖譜鑑定確認為Fe_3O_4晶體結構。

結論

本研究證實其微米級Fe_3O_4為中空球殼結構，SEM影像觀察結果，顯示經過還原反應製備之微米級球體尺寸平均尺寸約為0.62 um。進一步進行橫截面之TEM觀察，可清楚觀察到中空球結構。由繞射圖譜及軟體鑑定結果，可確定所製備之微米中空球其結晶相為Fe_3O_4。未來則以成功製備出Fe_3O_4中空球於下階段研究探討在材料表面之修飾去改變其功能表面特性，尋求最佳特殊材料特性與應用。

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On STEM Observations of $HfN/HfSi_2$ Interface

Yu-Siang Fang (方鈺翔)*, Kun-An Chiu (丘坤安), Thi Hien Do (杜氏賢), and Li Chang** (張立)

Department of Materials Science and Engineering, National Chiao Tung University, Hsinchu, Taiwan, ROC.

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Epitaxial cubic HfN films were grown on Si(100) substrates by DC magnetron reactive sputtering of Hf target with Ar/N_2 gas mixture. Cross-sectional TEM/STEM observations reveal that an epitaxial orthorhombic $HfSi_2$ layer on Si forms prior to growth of the (200) HfN film. The epitaxial relationship can be shown as HfN(100)[011] // $HfSi_2$(020)[100] // Si(100)[011]. STEM-ADF image of $HfN/HfSi_2$ interface is shown in Fig. 1. The Z-contrast illustrates that the bright dots are corresponding to Hf atomic columns. From the sharp interface between HfN and $HfSi_2$, the variations of image contrast and the intensity profile suggest that Hf atomic columns of $HfSi_2$ are in contact with HfN.

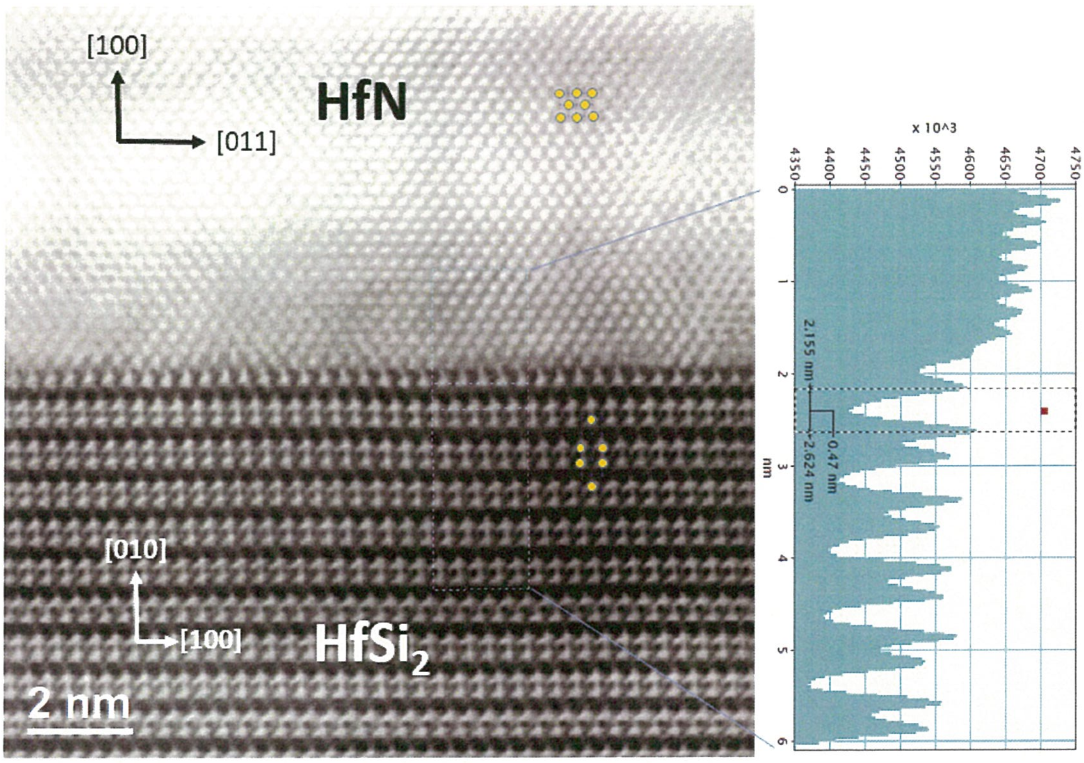

Figure 1. STEM-ADF image (after Wien filtering) showing the Z-contrast across the $HfN/HfSi_2$ interface with intensity profile. Bright dots corresponding Hf atomic columns. Zone axis // HfN $[0\bar{1}1]$ // $HfSi_2$ [001]. projected positions of Hf atoms in both HfN and $HfSi_2$ unit cells are schematically shown in yellow color dots.

Discipline: Materials Science.

Development of special SEM stage for environment sensitive materials investigation

Shih-Yi Liu (劉鈽誼),[1] Yu-Fang Haung (黃鈺方),[1] Chun-Wei Haung (黃浚瑋),[1] Cheng-Yu Hsieh (謝承佑),[1] and Shen-Chuan Lo (羅聖全)[1*]

[1]Dept. of Electron Microscopy Development & Application, Industrial Technology Research Institute, Hsinchu, Taiwan

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Understanding the failure mechanism such as dendrite growth during charge/discharge cycle of lithium ion battery (LIB) is crucial for its application in safety manner. However, the active lithium prone to react with the elements, for instance O_2 and H_2O, present in atmosphere[1] and therefore the observed result always deviates far from the real situation while battery is working. To overcome this bottleneck, we designed a special stage to isolate the considerable amount of O_2 and H_2O in air from LIB sample during the transferring between glove box and SEM so that ensure the pristine morphology and lithium dendrite shape can be observed. The comparison of oxygen peak intensity between air exposed and unexposed sample further confirms the feasibility of our concept.

References

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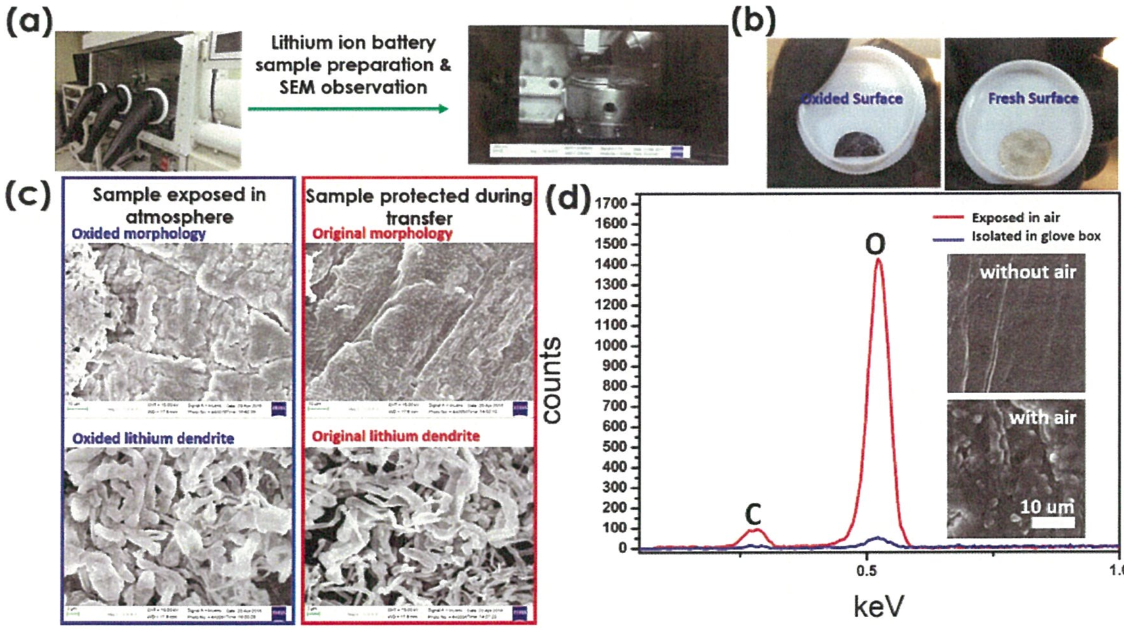

Figure 1. Investigation procedure and result of lithium-based battery materials (a) Sample preparation and the sample protection box in SEM. (b) Photographs of air-contaminated and uncontaminated surface. (c) SEM images of sample morphologies and lithium dendrite shapes with and without air exposure. (d) Degree of sample oxidation characterized by oxygen peak intensity of EDS.

Discipline: Energy and Materials Science.

Growth mechanism of titanium germanosilicide on an epitaxial interface of Ti/Si_xGe_{1-x}

Jit Dutta, Yu-Liang Hsiao, Kapil Gupta, and Chuan-Pu Liu*

Department of Materials Science and Engineering, National Cheng Kung University, Tainan 701, Taiwan

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The low resistivity of metal silicides make it of interest for application in CMOS devices, in order to reduce the series resistance in the source and drain regions. On CMOS device gate, metal silicide is developed on-top of the poly-Si to produce an Ohmic contact between the poly-Si and aluminum wire. Nowadays, due to increasing applications and reducing feature size, selective deposition of a sacrificial Si-Ge alloy layer has proven to be beneficial. Titanium silicide ($TiSi_2$) is widely used as a metal silicide interlayer, but there are many challenges for the epitaxial growth of titanium germanosilicide ($Ti(Si_xGe_{1-x})_2$) on the germanosilicide (SiGe) layer [1]. One of the known challenges is considered to be different diffusion rates of Ti, Si, and Ge in $Ti(Si_yGe_{1-y})_2/Si_xGe_{1-x}$ and the competing Ti-Si and Ti-Ge reaction paths [2]. Therefore, understanding the Ti-Si_xGe_{1-x} reaction and associated materials properties will be essential for optimizing this technique. In order to find a solution, the composition and quality of interface between Ti and Si_xGe_{1-x} has been studied using TEM, HRTEM, and EDX with a Z-contrast imaging technique (STEM-HAADF), which will be discussed in detail.

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1. D. B. Aldrich *et al.*, J. Appl. Phys., **77** 5107 (1995).

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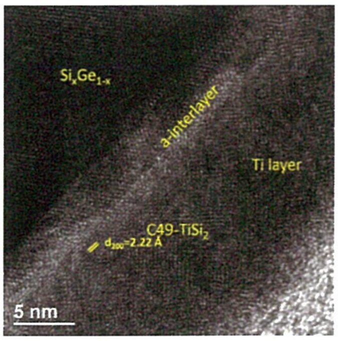

Figure 1. HRTEM image of Ti-Si_xGe_{1-x} layer annealed at 400 ^oC.

Discipline: Physics and Materials Science.

學生:莊庭牧
學校:國立台灣大學
指導教授:楊哲人教授
投稿項目:海報
題目: Two-step isothermal transformation in carbide-free bainite
摘要: This study mainly focused on the effect of two-step isothermal transformation on the reaction rate and the volume fraction of carbide-free bainite. A dilatometer was used for heat treatment and the resulting data were a direct evidence manifesting the effect on reaction rate and the amount of bainite. Optical microscopy (OM) and scanning electron microscope (SEM) micrographs were used to determine whether the amount of bainite do increase.

Kinematic Study of Growth Mechanism of ZnO thin film during-oblique angle deposition using transmission electron microscopy and XRD

Chiao-Yen Wang (王喬彥),[1] and Chuan-Pu Liu (劉全璞)[1*]

[1]Department of Materials Science and Engineering, National Cheng Kung University, Tainan, Taiwan

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Oblique-angle deposition (OAD) was adopted to synthesize ZnO thin film. Inclined ZnO film with tilting columnar grains of 18□, relative to the substrate surface normal, can be confirmed by SEM and TEM. The diffraction pattern shows that ZnO has a narrow range of (0002) peak distributed, indicating that there is bending of nanocolumn and therefore arc signal can be observed. And from cross-sectional image and diffraction pattern, monotonic bending of nanocolumns is inspected, rather than continuous bending. This observation demonstrate that the tilting of ZnO thin film may not be caused by dislocation, but by incident angle of incident source. The tilting of ZnO is also verified by two-dimensional XRD and pole figure.

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2. N. J. Ku, Nano Lett, **12** 562 (2012).

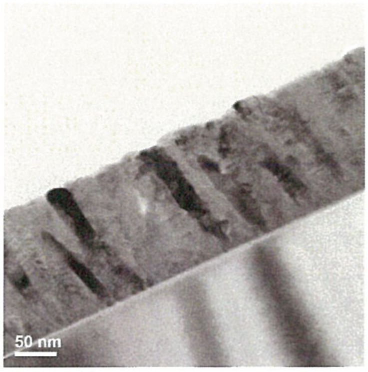

Figure 1. Cross-sectional TEM image of inclined ZnO thin film

Discipline: ____Biology and Biomedical science or____Physics and Materials Science.

2018 台灣顯微鏡學會 壁報發表暨評比競賽
國立台灣大學 材料所 楊哲人老師實驗室 鍾采甫同學

Nucleation mechanisms of precipitates in the AA7050 aluminium alloy by HRTEM and HAADF-STEM investigations

Tsai-Fu Chung[a], Yo-Lun Yang[b], Chien-Nan Hsiao[c], Wei-Chih Li[d], Jer-Ren Yang[a]

[a] Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

[b] Department of Mechanical Engineering, Imperial College London, London SW7 2AZ, UK

[c] Instrument Technology Research Center, National Applied Research Lab, Hsinchu, Taiwan

[d] E.A. Fischione Instruments, Inc., 9003 Corporate Circle, Export, PA 15632, U.S.A.

Abstract

In this study, the investigation of the nucleation mechanisms has been investigated. The detail microstructures of precipitates such as GP zones, η' precipitates and η precipitates with their related orientation relationships respect to the Al matrix were explored by high resolution transmission electron microscopy (HRTEM) and high angle annular dark field scanning transmission electron microscopy with Cs corrector (Cs-corrected HAADF- STEM). The precise transformation mechanisms, such as GP zones → η' precipitates, and η' precipitates → η precipitates, have not been elucidated clearly. In steels, the transitions of carbides have been explored in previous works such as the separated nucleation and in-situ nucleation[1, 2]. Although previous works presumed that these two nucleation mechanisms occur during the transition of GP zones → η' precipitates, and η' precipitates → η precipitates, nowadays TEM/STEM evidences have yet to be provided. The present study aimed to employ a series of in-situ HRTEM images and HAADF-Cs-STEM images to confirm the separated nucleation of GP zones → η' precipitates, and the in-situ nucleation of η' precipitates → η precipitates, respectively.

Reference

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[2] A. Inoue, et al., Trans. Jpn. Inst. Met 19 (1978) 11-17.

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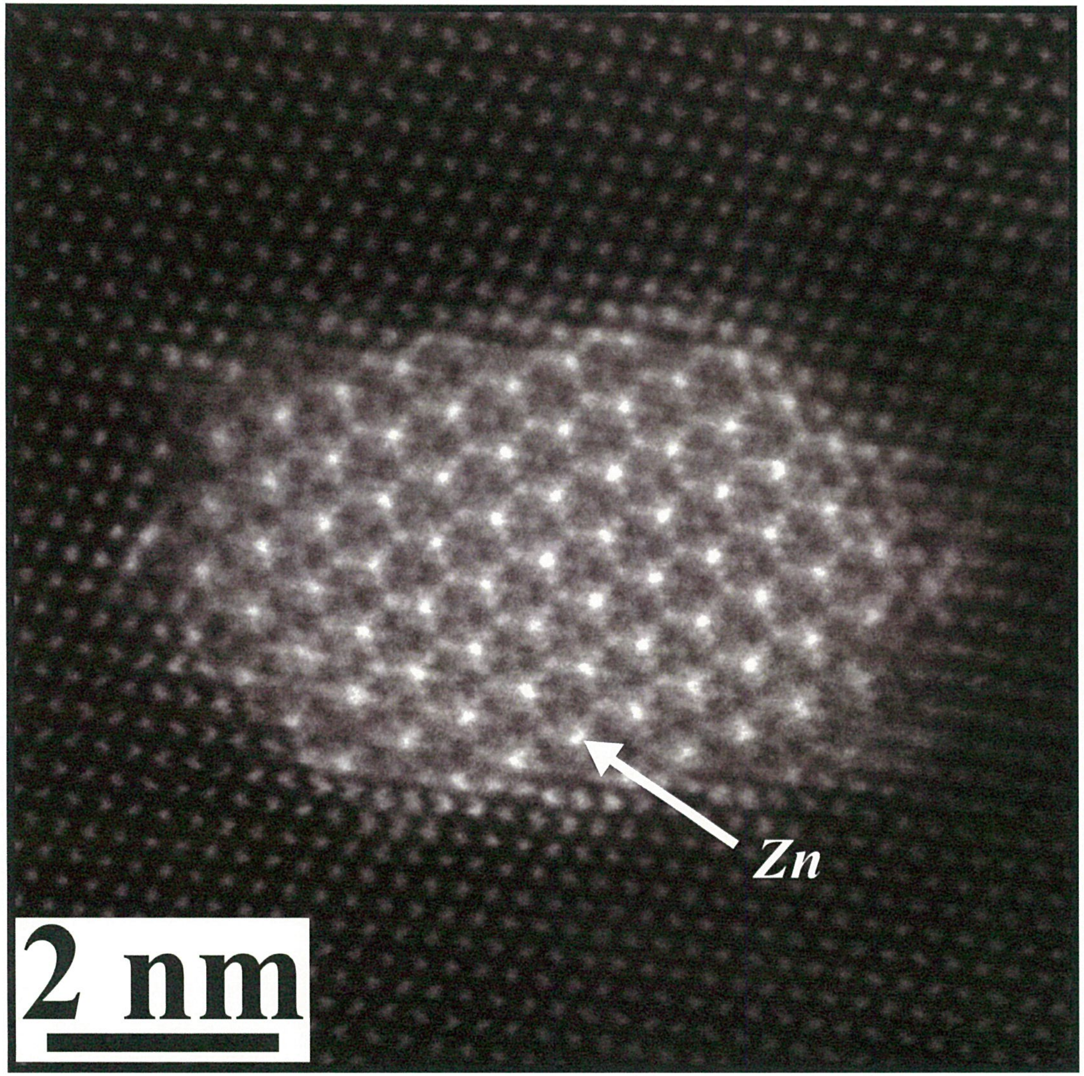
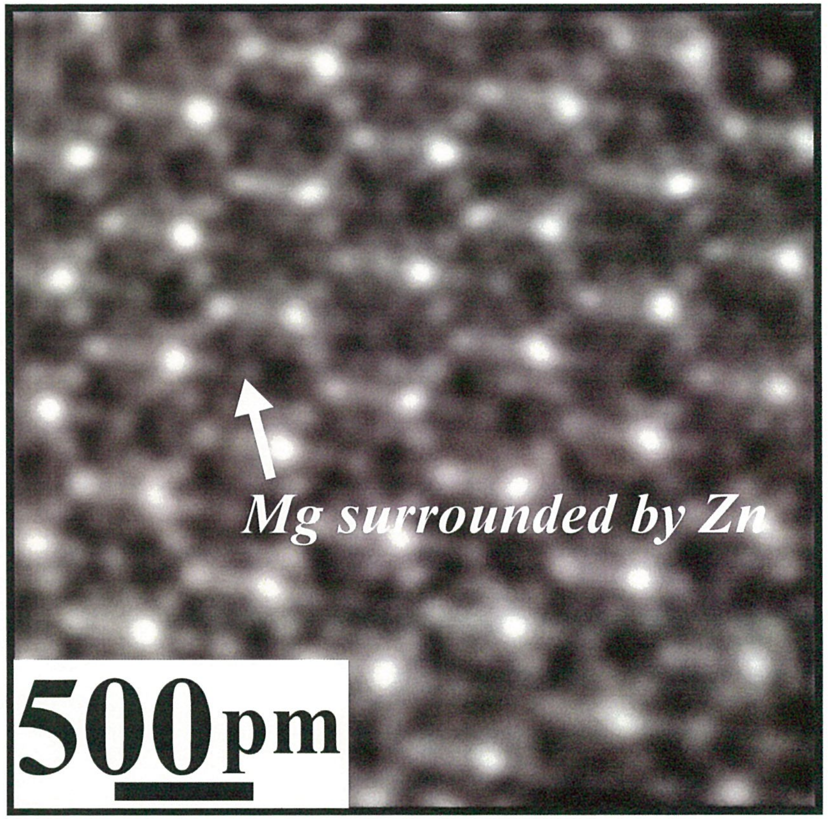
2018年台灣顯微鏡學會-攝影圖片評比競賽

國立台灣大學 材料所 鍾采甫

Art Photo Contest





Enlarged Figure

Graphite-like precipitates in the AA7050 aluminium alloys

AA7050 aluminium alloy, η precipitates possessing 11 types were investigated according to their orientation relationships. Under $[110]_{Al}$ zone, the cross-section of HR-STEM images portrayed the beauty of the crystal. The atomic configurations were displayed as graphite-like atomic arrangements.

台灣顯微鏡學會　會章

中華民國八十七年十月十七日會員大會修訂通過
中華民國九十八年八月二十八日會員大會修訂第一章第一條通過
中華民國九十九年六月二十二日會員大會修訂第四章第九條、第十條及增列第七章第二十三條通過
中華民國一百零三年六月二十二日會員大會修訂第四章第九條、十條及取消第十三、第十四條

第一章　總　則

第一條：本學會定名為台灣顯微鏡學會（英文為 Microscopy Society of Taiwan, MST）。

第二條：本學會主要以促進顯微鏡相關學術之研究與發展，以及相關知識之交換與切磋為宗旨。

第三條：本學會設於中華民國中央政府所在地，必要時得設分會於其他地區。

第二章　任　務

第四條：本學會任務如下：
一、 促進顯微鏡相關學術之研究與發展以及相關知識之交流與切磋。
二、 收集有關之書籍與資料。
三、 編印會誌及出版其他有關刊物。
四、協助解決與顯微鏡有關之研究與應用問題

第三章 會　員

第五條：凡贊同本學會宗旨，經會員兩人以上之介紹，並經本學會理事會之通過， 得為本會永久會員、一般會員、學生會員或團體會員。
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二、 選舉權、被選舉權及罷免權。
三、 贊助會員、學生會員無選舉權、被選舉權、罷免權及表決權。
四、 本會所舉辦各種事業之利益。

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一、 遵守本學會會章及決議案。
二、 擔任本學會所指派之任務。
三、 繳納會費。

第四章 組　織

第八條：本會以會員大會為最高權力機構，在會員大會閉幕期間由理事會代行其 職權。

第九條：本會置理事十五人，候補理事七人，監事五人，候補監事二人，均由會 員大會選舉之，並互選常務理事五人，組織常務理事會；監事組織監事 會，並互選常務監事一人。以上所選出之理事、監事、候補理事、候補 監事、常務理事及常務監事人選之中，物理學科專長與生物學科專長， 各占一半為原則，理事長人選可納入產業界人士，副理事長增為兩位， 而理事長與兩位副理事長之專業領域必須互補。本屆理事會得提出下屆理事、監視候選人參考名單。理事、監事得採通訊選舉。通訊選舉辦法由理事會通過，報請主管機關核備後行之。

第十條：本會置理事長一人，任期二年，由理事就常務理事中票選一人，理事長 連選得連任一次。

第十一條：本會理、監事均為義務職。

第十二條：本會理、監事任期均為二年，每年改選半數理、監事及常務理事，連 選得連任一次。

第十三條：本會理、監事如有下列情形者應予解除其職務：

一、 辭職經會員大會議決准其辭職者。

二、 曠廢職務經會員大會議決解除其職務者。

三、 職務上違反法令或有其他重大不正當行為，經會員大會議決令其退職者。

第十四條：本會得設置各種委員會。

第五章 會 議

第十五條：本會會員大會每年舉行一次討論會務、宣讀論文及選舉理監事。

第十六條：會員對大會提案須由會員三人以上簽署，提交理事會經理監事聯席會 議審查後，提交大會討論表決。

第十七條：本會必要時得召開臨時大會，由理事會決定之或全體會員四分之一以 上連署時召開之。

第十八條：本會理事會、監事會每四個月開會一次，常務理事會每月必要時均得舉行臨時會或舉行理監事聯席會議。理監事聯席會議由理事長召開之。開會一次，

第六章 經 費

第十九條：本會經費以下列各款充之

一、 會員入會費、常年會費及永久會費。

（一）永久會員： NT.3000

（二）一般會員：入會費 NT.1000

（三）學生會員：入會費 NT.500

二、政府及其他機構之補助款。

三、會員捐贈。

四、基金之利息

第七章 附 則

第二十條：本會解散會撤銷時，除清償債務外，其餘財產不得以任何方式歸屬個人或私人企業所有，應歸屬政府所有。

第二十一條：本會各項辦事細則列訂之。

第二十二條：本會會章經會員大會三分之二以上多數通過。呈請內政部備案後實行之修改時亦同。

第二十三條：本學會理事長、副理事長、或常務監事等，任期間若因出國或其他因素而請辭，其代理人選，理事長出缺，由兩位副理事長互推擔任，副理事長出缺則由理事長從互補領域之常務理事中指派一位登任，常務監事出決則由監事互推擔任。

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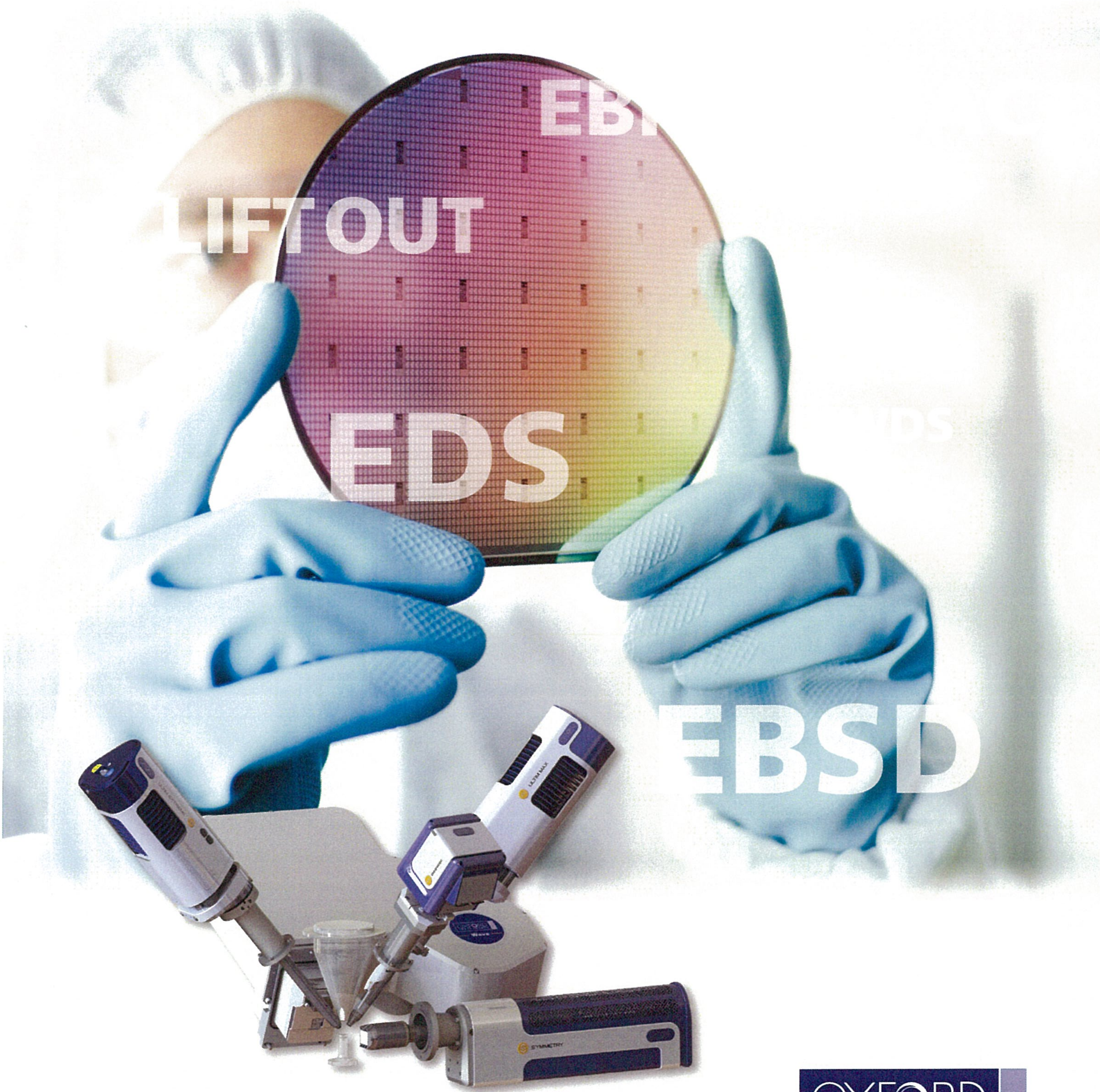

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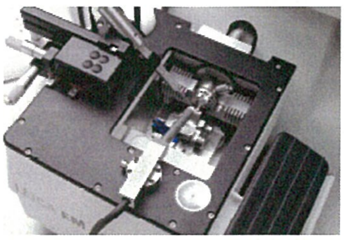

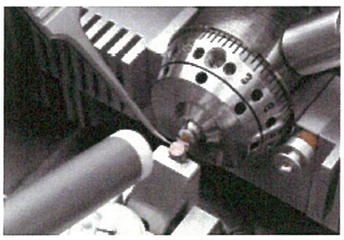

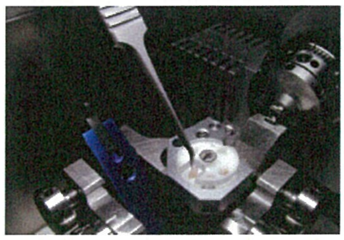

台灣總代理

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