

# Contents

Preface	v
1. Deborah Duen Ling Chung: Innovator in Engineering Materials Use	1
1.1 Introduction by the Editor	1
1.1.1 Use of engineering materials	1
1.1.2 Scientific contributions of Dr. Chung	2
1.1.3 Honors received by Dr. Chung	3
1.1.4 Career development of Dr. Chung	3
1.2 Dr. Chung's Description of Her Life Experience	5
1.2.1 In school in Hong Kong	5
1.2.2 In university in USA	9
1.2.3 Research in graphite	11
1.2.4 Research in smart concrete	14
1.2.5 Research in materials for electromagnetic interference shielding	15
1.2.6 Research in materials for microelectronic cooling	16
1.2.7 Outreach as a scientist	18
1.2.8 Reflections of my 30-year career	20
2. James Chen Min Li: Leader in the Science of Engineering Materials	21
2.1 Introduction by the Editor	21
2.1.1 What are engineering materials?	21
2.1.2 What is the science of engineering materials?	22
2.1.3 Scientific contributions of Dr. Li	22
2.1.4 Honors received by Dr. Li	23
2.1.5 Career development of Dr. Li	23
2.2 Dr. Li's Description of His Life Experience	24
2.2.1 Read the literature (1)	24
2.2.2 Read the literature (2)	25
2.2.3 Read the literature (3)	26
2.2.4 Take the challenge (1)	27

2.2.5	Take the challenge (2) .....	29
2.2.6	Take the challenge (3) .....	30
2.2.7	Take a calculated risk .....	30
2.2.8	Benefit from group discussions .....	31
2.2.9	Benefit from a group study .....	32
2.2.10	Interact with others.....	34
2.2.11	Note of general concerns.....	35
2.2.12	Verify a famous equation .....	36
2.2.13	Follow your intuition.....	37
2.2.14	Plan a group attack.....	38
2.2.15	Know your students .....	38
2.2.16	Work hard .....	42
2.2.17	Prepare yourself .....	43
2.2.18	Get good grades .....	45
2.2.19	Marry the right person and educate your children .....	47
2.2.20	Get the proper rest .....	48
2.2.21	Work across disciplines.....	48
2.2.22	Summary .....	49
	References.....	49
3.	Paul Ching-Wu Chu: Inventor of High Temperature Superconductor	51
3.1	Introduction by the Editor .....	51
3.1.1	What is a superconductor? .....	51
3.1.2	Invention of Dr. Chu .....	52
3.1.3	Contributions of Dr. Chu to science .....	54
3.1.4	Contributions of Dr. Chu to education and research organization.....	54
3.1.5	Honors received by Dr. Chu.....	55
3.1.6	Career development of Dr. Chu .....	56
3.2	Dr. Chu's Description of His Life Experience .....	57
3.2.1	Happy boyhood in Ching-Shui.....	57
3.2.2	Great teachers in Taiwan.....	60
3.2.3	Great teachers in the U.S. ....	61
3.2.4	The torturous path to high temperature superconductivity (HTS) .....	65
3.2.4.1	Before 1986.....	65
3.2.4.2	The critical year of 1986.....	67
3.2.4.3	The exciting 1987 & the "Woodstock of Physics".....	69
3.2.4.4	After 1987 – continued excitements.....	75
3.2.5	University presidency .....	76

4. Eli Ruckenstein: Leader in Chemical Process Development	77
4.1 Introduction by the Editor	77
4.1.1 What is chemical process development?	77
4.1.2 Scientific contributions of Dr. Ruckenstein	78
4.1.3 Honors received by Dr. Ruckenstein	78
4.1.4 Career development of Dr. Ruckenstein	80
4.2 Dr. Ruckenstein's Description of His Life Experience	80
5. Jennie S. Hwang: Pioneer in Surface Mount Technology and Environment-Friendly Lead-Free Electronics	91
5.1 Introduction by the Editor	91
5.1.1 What is surface mount technology?	91
5.1.2 What is environment-friendly lead-free electronics?	91
5.1.3 Honors and recognition received by Dr. Hwang	92
5.1.4 Contributions of Dr. Hwang in technology and scholarship	94
5.1.5 Contributions of Dr. Hwang in business	96
5.1.6 Contributions of Dr. Hwang in civic and professional services	97
5.1.7 Formal education of Dr. Hwang	98
5.2 Dr. Hwang's Description of Her Life Experience	98
5.2.1 The first stage – schooling and preparing for the future	98
5.2.2 The second stage – intellectual maturation and growth	101
5.2.3 The third stage – a time to contribute with what has been learned	102
5.2.4 Work and family	104
5.2.5 Thoughts on opportunity	109
5.2.6 Reading, writing and speaking	111
5.2.7 Thoughts on globalization	114
5.2.8 Thoughts on future workforce	116
5.2.9 Thoughts on engineering education	117
5.2.10 Thoughts on practical knowledge and entrepreneurship	119
5.2.11 Thoughts on leadership	120
5.2.12 Pioneering and long-standing work in SMT	121
5.2.13 Leadership in environment-friendly lead-free electronics	123
5.2.13.1 Development of lead-free electronics	123
5.2.13.2 What made the commercial success?	124
5.2.14 Prime of life – into the future	125
6. Douglas D. Osheroff: Winner of the 1996 Nobel Prize in Physics	129
6.1 Introduction by the Editor	129
6.1.1 The Nobel Prize	129

6.1.2	What is superfluidity in helium-3 .....	130
6.1.3	Scientific contributions of Dr. Osheroff .....	130
6.1.4	Honors received by Dr. Osheroff.....	131
6.1.5	Career development of Dr. Osheroff.....	132
6.2	Dr. Osheroff's Description of His Life Experience.....	132
7.	Klaus Biemann: The Father of Organic Mass Spectrometry .....	143
7.1	Introduction by the Editor .....	143
7.1.1	What is organic mass spectrometry.....	143
7.1.2	Scientific contributions of Dr. Biemann.....	144
7.1.3	Honors received by Dr. Biemann .....	145
7.1.4	Career development of Dr. Biemann .....	145
7.2	Dr. Biemann's Description of His Life Experience.....	145
7.2.1	Student years .....	146
7.2.2	Moving to MIT .....	150
7.2.3	Starting the academic career.....	152
7.2.4	Learning about mass spectrometry .....	154
7.2.5	Alkaloids .....	159
7.2.6	Nationwide collaborations .....	166
7.2.7	Combining gas chromatography with mass spectrometry (GCMS) .....	167
7.2.8	Peptides and proteins.....	170
7.2.9	Moon and Mars.....	173
7.2.10	Epilogue .....	174
7.3	Appendix A: Muscopyridine .....	176
7.4	Appendix B: Sarpagine .....	177
7.5	Appendix C: Peptides and Proteins .....	179
8.	James W. Mayer: Pioneer in Semiconductor Device Development .....	181
8.1	Introduction by the Editor .....	181
8.1.1	What is a semiconductor device? .....	181
8.1.2	Scientific contribution of Dr. Mayer.....	183
8.1.3	Educational contribution of Dr. Mayer.....	183
8.1.4	Honors received by Dr. Mayer .....	184
8.1.5	Career development of Dr. Mayer.....	184
8.2	Dr. Mayer's Description of His Life Experience .....	184
9.	Herbert A. Hauptman: Winner of the 1985 Nobel Prize in Chemistry .....	199
9.1	Introduction by the Editor .....	199
9.1.1	Nobel Prize in Chemistry .....	199
9.1.2	Scientific contributions of Dr. Hauptman .....	200
9.1.3	Honors received by Dr. Hauptman .....	201

9.1.4	Career development of Dr. Hauptman .....	202
9.2	Dr. Hauptman’s Descriptions of His Life Experience.....	206
10.	Agnes Oberlin: Leader in Analyzing the Structure of Carbon Materials	209
10.1	Introduction by the Editor .....	209
10.1.1	What are carbon materials? .....	209
10.1.2	What is the structure of carbons? .....	210
10.1.3	Scientific contributions of Dr. Oberlin.....	211
10.1.4	Honors received by Dr. Oberlin.....	212
10.1.5	Career development of Dr. Oberlin.....	213
10.2	Dr. Oberlin’s Description of Her Life Experience.....	213
	<i>Index</i>	225