

Contents

Preface ix

1. Some Basics	1
1.1. Measuring Adhesion	2
1.2. Adhesion Failure	4
1.3. Crack Propagation	7
1.4. True Adhesion	10
2. The Myths around Surface Energy and Roughness	13
2.1. Proofs of the Importance of Surface Energy	14
2.2. Proofs of the Non-importance of Surface Energy	18
2.3. A More Nuanced View	23
2.4. Surface Preparation and the Roughness Myth	30
2.5. Beyond Surface Myths	43
3. Intermingling and Entanglement	45
3.1. Beyond Pure Surfaces	48
3.2. Chemical Bonds	53
3.3. Desirable but Not Sufficient	55
3.4. M_c the Critical Entanglement MWt	59
3.5. Why Crosslinks are Nothing Special	62
3.6. ΣNU and W_0	65
3.7. The Molecular Level	67

3.8. Inhomogeneous Interfaces	69
3.9. Not Just the Interface	72
3.10. The Near-interface Region	74
3.11. Beyond Corona: Adhesibility	76
3.12. Adhesion	81
3.13. We Need Even More	82
4. Time is the Same as Temperature	85
4.1. WLF or TTS	88
4.2. Rheology for All	93
4.3. Is Your Liquid a Solid?	101
4.4. Oscillations, Phases, Elastic and Plastic	103
4.5. Doing It By Numbers	108
5. Strong Adhesion with a Weak Interface	111
5.1. Strength Through Weakness in Normal Adhesives	111
5.2. PSA	113
5.3. Hot-melt Adhesives	160
5.4. PSA as the Symbol of Dissipative Adhesion	167
6. Formulating for Compatibility	169
6.1. Like Dissolves Like	171
6.2. The Three HSP	172
6.3. Measuring HSP	175
6.4. Using HSP in Adhesion	176
6.5. The HSP of Adhesion	179
6.6. Di-block Adhesion	184
6.7. HSP and Inorganic Primers	186
6.8. (In)Compatibility in PSA	187
6.9. It is All Very Well in Theory ...	189
6.10. Strengths and Limitations	191
6.11. Silicones and Fluoropolymers	193
6.12. Wetting	194
6.13. HSP for Resistance	196
6.14. Summary	197
7. Measuring Adhesion: Perils and Pitfalls	199
7.1. The Heart of the Problem	201
7.2. The Peel Test	201

7.3. The Tape Test	210
7.4. Indentation and Scratch Tests	214
7.5. The Blister Test	218
7.6. Cut Test	219
7.7. Beam Tests	219
7.8. Fragmentation Test	226
7.9. Pulling Things Apart Directly	229
7.10. Lap Peel	231
7.11. The Locus of Failure	239
7.12. Strain	241
7.13. Impact Testing	243
7.14. The Perfect Measure of a PSA	243
7.15. Working with Weibull (or Not)	260
7.16. What About the Interface?	263
7.17. The Best Adhesion Test	265
8. Putting Things into Practice	269
8.1. The Secret of Success	269
8.2. Think Outside the Bond	273
8.3. Problem Solving	291
8.4. Before You Formulate	293
8.5. Last Words	294

<i>Index</i>	295
--------------	-----