

Contents

1	Introduction	1
1.1	Scope of the Thesis	1
1.2	Physics Background of Spin-Orbit Interaction	2
1.2.1	Spin-Orbit Interaction in Crystalline Solids	3
1.2.2	Spin-Orbit Interaction at Surfaces	4
1.3	Outline of the Thesis	6
	References	7
2	Experiment	9
2.1	Spin- and Angle-Resolved Inverse Photoemission	10
2.2	Experimental Setup	13
2.3	The Rotatable Spin-Polarized Electron Source	15
2.3.1	Constructional Details and Quantization Axes	15
2.3.2	Characterization	18
2.4	Performance	21
2.4.1	Ni/W(110)	21
2.4.2	Au(111)	23
	References	26
3	Spin Textures on $\text{Ti/Si(111)-(1}\times\text{1)}$	31
3.1	Motivation	31
3.2	The Sample System	34
3.2.1	Si(111)	35
3.2.2	Ti/Si(111)-(1 $\times$ 1)	36
3.3	Results for the $\bar{\Gamma}\bar{\text{K}}(\bar{\Gamma}\bar{\text{K}}')$ Direction	40
3.3.1	Theoretical Predictions	40
3.3.2	Occupied Surface States	41
3.3.3	Unoccupied Surface States	43
3.3.4	Spin Texture	48
3.3.5	Conclusion	51

3.4	Results Around $\bar{K}$	52
3.4.1	Unoccupied Valleys	52
3.4.2	Spin Texture	54
3.4.3	Occupied Valleys	55
3.4.4	Conclusion.	58
3.5	Results for the $\bar{\Gamma}M$ Direction	58
3.5.1	Unoccupied Surface States	58
3.5.2	Spin Texture	61
3.5.3	Conclusion.	62
3.6	Results for the $\bar{K}M(\bar{K}'M)$ Direction	63
3.6.1	Unoccupied Surface States	63
3.6.2	Spin Texture	65
3.6.3	Conclusion.	66
3.7	Results Around $\bar{M}$	66
3.7.1	Spin Texture	67
3.7.2	Conclusion.	69
	References.	69
4	Summary	75
	Reference	76
	Appendix	77
	Curriculum Vitae	79

Spin-Orbit-Induced Spin Textures of Unoccupied Surface
States on Tl/Si(111)

Stolwijk, S.D.

2015, XVII, 80 p. 38 illus., 36 illus. in color., Hardcover

ISBN: 978-3-319-18761-7