

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Theory and experimental techniques</b>	<b>7</b>
2.1	Introduction to holography . . . . .	7
2.2	Principle of off-axis electron holography . . . . .	15
2.3	Experimental techniques . . . . .	30
2.4	Lorentz microscopy . . . . .	43
<b>3</b>	<b>Microstructure of FeCo-based alloys</b>	<b>49</b>
3.1	Introduction . . . . .	50
3.2	TEM plan-view imaging and electron diffraction analysis . . . . .	56
3.3	HRTEM investigation . . . . .	64
3.4	STEM-HAADF imaging . . . . .	71
3.5	EDX spectrum analysis . . . . .	72
3.6	Summary . . . . .	75
<b>4</b>	<b>Magnetic domain structure of FeCo-based alloys</b>	<b>77</b>
4.1	Introduction . . . . .	78
4.2	Investigation of magnetic domain structure . . . . .	86
4.3	Determination of domain wall width . . . . .	98
4.4	Quantitative measurement of magnetic flux density . . . . .	106
4.5	Dynamical magnetization . . . . .	113
4.6	Correlation between microstructure and magnetic domain structure . . . . .	123
4.7	Fe-based B-free nanocrystalline alloys . . . . .	126

4.8	Summary	130
<b>5</b>	<b>Reconstruction of 3D (Si,Ge) islands by 2D phase mapping</b>	<b>133</b>
5.1	Introduction	133
5.2	Principle of 3D imaging by 2D phase mapping	136
5.3	CTEM investigation of (Si,Ge) islands	141
5.4	Experimental phase mapping	145
5.5	Mean inner potential calculation	149
5.6	Summary	160
<b>6</b>	<b>Summary and outlook</b>	<b>163</b>
6.1	Summary	163
6.2	Outlook and further suggestions	166
<b>Bibliography</b>		<b>171</b>