

Contents

1	Introduction	1
2	Quantum Wells	3
3	Impurities in Bulk	5
3.1	Effective Mass Theory	5
3.2	Donors	6
3.3	Acceptors	7
3.4	Isovalent Centers	8
4	Confined Neutral Donor States	11
4.1	Theoretical Aspects	11
4.1.1	The Effective Mass Approximation	12
4.1.2	The Presence of an External Field	16
4.2	Experimental Aspects	18
4.2.1	Infrared Measurements	18
4.2.2	Raman Measurements	21
4.2.3	Luminescence Measurements	21
4.2.4	Selective Luminescence	28
4.2.5	Magneto-optics	31
4.2.6	Time Resolved Spectroscopy	33
5	The Negatively Charged Donor	35
5.1	Theoretical Aspects	35
5.2	Experimental Aspects	37
6	Confined Acceptor States	39
6.1	Theoretical Aspects	39
6.1.1	Effective Mass Approximation	39
6.1.2	The Presence of an External Field	44
6.2	Experimental Aspects	48
6.2.1	Infrared Measurements	49
6.2.2	Raman Scattering	50
6.2.3	Hole g -Values	50
6.2.4	Luminescence Measurements	52

6.2.5	Selective Photoluminescence and Excitation Spectroscopy	53
6.2.6	Recombination Processes	53
6.2.7	Two-Hole Transitions of Bound Exciton	57
6.2.8	The Dependence of the Binding Energy on the Position in the Well	66
6.2.9	Magneto-optical Properties	71
6.2.10	Strain Effects on the Electronic Structures of Acceptors	76
6.2.11	Dynamics	78
7	The High Doping Regime	87
7.1	Band Filling Effects	91
7.2	Bandgap Renormalization	96
7.3	Many Body Effects	98
7.4	Fermi Edge Singularity	101
7.5	Charged Excitons	101
7.5.1	Negatively Charged Excitons	102
7.5.2	Positively Charged Exciton	105
7.6	Effect of an Applied Magnetic Field	107
7.7	Exciton Quenching	110
7.8	Interacting Impurities	112
8	Hydrogen Passivation	117
9	Conclusions	123
	References	125
	Index	135

<http://www.springer.com/978-3-540-22320-7>

Impurities Confined in Quantum Structures

Holtz, O.; Zhao, Q.X.

2004, VIII, 139 p., Hardcover

ISBN: 978-3-540-22320-7