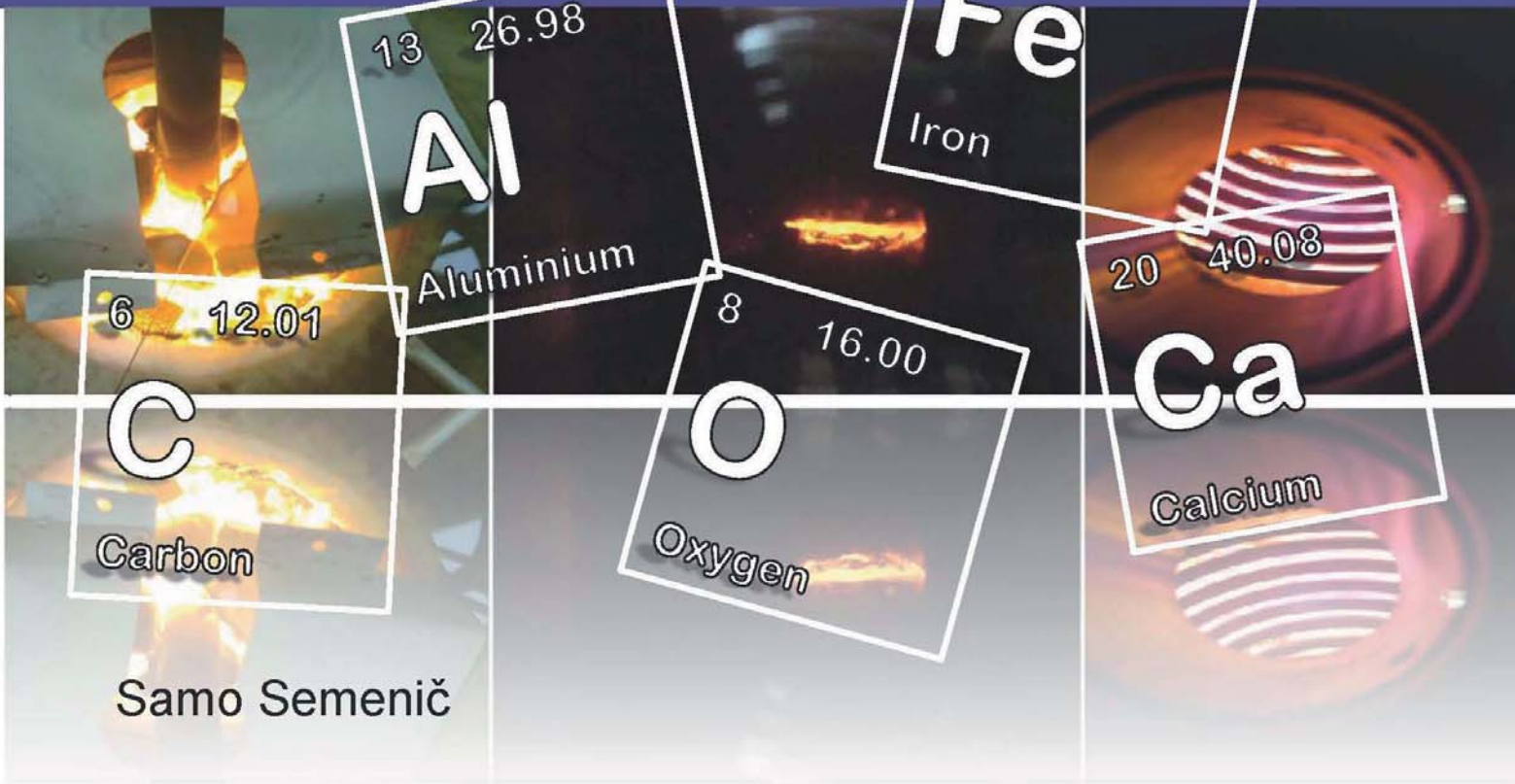
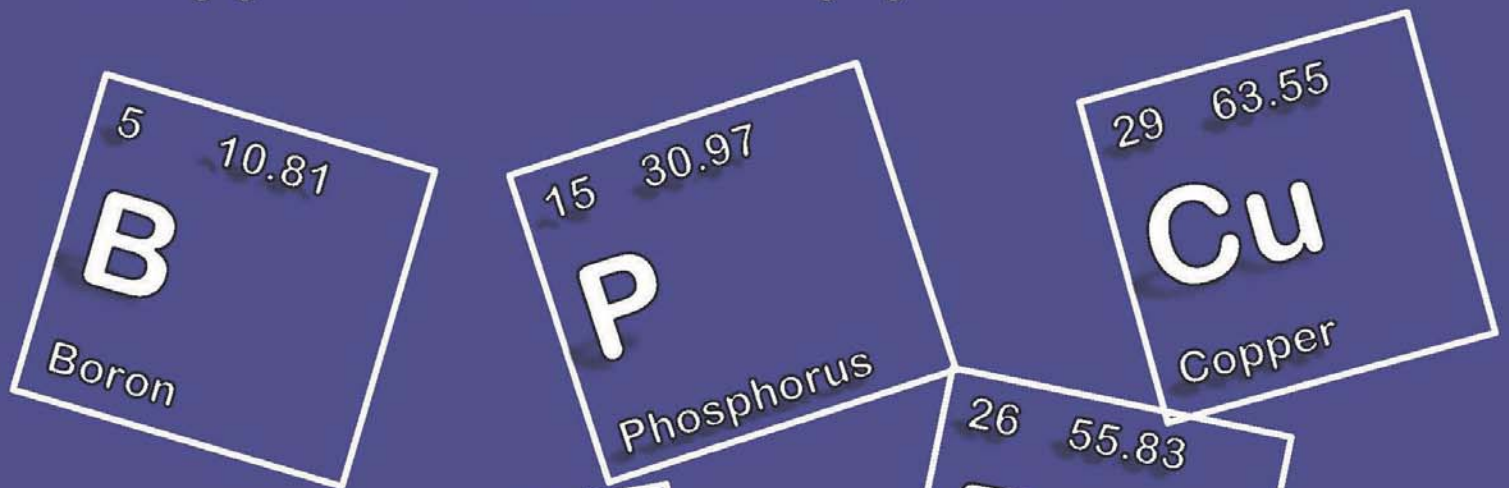




UPGRADED METALLURGICAL SILICON FOR APPLICATION IN THE PHOTOVOLTAIC INDUSTRY



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UPGRADED METALLURGICAL SILICON FOR APPLICATION IN THE PHOTOVOLTAIC INDUSTRY

von
Samo Semenič

Von der Fakultät V,
Verkehrs- und Maschinensysteme
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Preface

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Contents

Preface	iii
List of Tables	ix
List of Figures	x
List of Abbreviations	xiii
1 Introduction	1
1.1 History	1
1.2 Applications	2
1.2.1 Applications in the aluminum industry	2
1.2.2 Applications in chemistry	2
1.2.2.1 Silicones	2
1.2.2.2 Synthetic silica	2
1.2.2.3 Functional silane	3
1.2.3 Semiconductor silicon	3
1.2.3.1 Mono-crystalline silicon	4
1.2.3.2 Multi-crystalline silicon	5
1.2.4 Thin film solar cell	6
1.3 Market	8
1.4 Trends	11
1.4.1 Production increase	11
1.4.2 Upgraded metallurgical silicon	11
1.4.3 Pricing impact	12
1.4.4 Cost reduction opportunities	12
1.4.5 Silicon photovoltaic efficiency	13
1.4.6 Thinner wafers	14
1.4.7 Solar economics	15
1.4.8 Photovoltaic thin film	15
1.4.8.1 Amorphous silicon (a-Si)	16
1.4.8.2 Copper Indium Gallium Diselenide (CIGS)	16
1.4.8.3 Cadmium Telluride (CdTe)	16
1.5 Conclusions	17
2 Physical properties of silicon	19
2.1 The photovoltaic effect	21
2.2 Material properties and requirements for photovoltaic application	22
2.3 Photovoltaic cell efficiency	24
2.4 Lifetime	25

2.4.1	Mechanisms of recombination	27
2.5	Effect of various impurities	28
2.5.1	Atoms from Group IIIa (B, Al, Ga,...) or Va (N, P, As, Sb,...).....	29
2.5.1.1	Carbon.....	29
2.5.1.2	Oxygen	30
2.6	Resistivity and carrier transport parameter in silicon	31
2.6.1	Resistivity, mobility and diffusivity for n-type and p-type doped silicon .	31
2.6.2	Resistivity, dopant levels in solar grade silicon	32
2.6.3	Electron and Hole Minority Carrier Lifetime and Diffusion Lengths	35
2.7	Doping of silicon	37
2.8	Electrical resistivity	38
2.9	Conclusions.....	39
3	Process chain from quartz to high purity silicon	40
3.1	Reduction of quartz to metallurgical grade silicon in the arc furnace	40
3.1.1	The submerged arc furnace process and technical implementations ...	40
3.1.2	Input materials	41
3.1.2.1	Quartz.....	42
3.1.2.2	Carbon.....	43
3.1.2.3	Wood chips.....	44
3.1.3	Technological limitations regarding the purity of metallurgical grade silicon and process optimization	44
3.1.4	Energy and material balance of the submerged arc furnace process ...	46
3.2	Obtaining solar grade silicon from metallurgical grade silicon	48
3.2.1	Chemical routes	50
3.2.1.1	Wacker Chemie AG.....	50
3.2.1.2	Tokuyama Corporation	50
3.2.1.3	REC Group – REC silicon	51
3.2.2	Metallurgical routes.....	51
3.2.2.1	SOLSILC	51
3.2.2.2	Elkem Solar	51
3.2.2.3	Kawasaki Steel Corporation	52
3.2.2.4	Apollon Solar – Photosil project.....	52
3.2.2.5	UNICAMP	53
3.2.2.6	TIMMINCO	54
3.2.2.7	6N-Calisolar Inc.....	54
3.3	Conclusions.....	55
4	Purification of the metallurgical grade silicon	56

4.1	The “Siemens process”	56
4.2	The silane production process.....	59
4.3	The pyrolysis process	61
4.4	Crystallization	62
4.4.1	Segregation coefficients.....	62
4.4.2	The mathematical theory of directional coarsening	63
4.4.2.1	The Scheil equation for impurity reduction	64
4.4.2.2	Lever model of impurity reduction	66
4.4.2.3	Comparison of the Scheil and the lever model	67
4.4.2.4	Crystallization and potential applications.....	69
4.4.2.5	Burton model	82
4.4.2.6	Segregation coefficient in low impurity concentration	83
4.5	Czochralski method	85
4.5.1	Technological realization.....	85
4.6	Directional solidification	86
4.6.1	Technological realization.....	87
4.7	Reduction of boron	89
4.7.1	Slag treatment.....	89
4.7.2	Gas treatment	91
4.7.2.1	Treatment with O ₂ atmosphere.....	91
4.7.2.2	Treatment with H ₂ O-O ₂ mixture atmosphere	94
4.7.3	Plasma torch treatment.....	96
4.7.4	Acid treatment.....	98
4.7.4.1	Annealing and acid treatment - leaching	99
4.8	Reduction of phosphorus.....	101
4.8.1	Evaporation of silicon and the dissolved substances in vacuum.....	101
4.8.1.1	Evaporation of clean silicon.....	103
4.8.1.2	Evaporation of silicon and the dissolved substances	104
4.8.2	Material equations for the vapor pressure and the activity coefficient.	106
4.8.3	Possibility of Si-P alloys separation	109
4.8.4	Phase diagram of vapor-liquid equilibrium	110
4.8.5	Vacuum induction refining.....	111
4.8.6	Electron beam refining	112
4.9	Conclusions	113
5	Experimental results.....	114
5.1	Reduction of quartz (SiO ₂) with carbon in a specifically designed arc furnace	114

5.2	Reduction of boron	116
5.2.1	Slag treatment.....	116
5.2.2	Oxidative gas treatment	118
5.2.2.1	Plasma torch treatment	118
5.2.2.2	Gas blowing into the liquid silicon with a lance	121
5.3	Reduction of phosphorus at high temperature in vacuum	123
5.3.1	Reduction of phosphorus in the induction furnace	123
5.3.2	Reduction of phosphorus with electron beam technology	126
5.4	Unidirectional solidification (UDS), final cleaning by segregation of impurities	130
5.4.1	Crystal grow equipment	131
5.4.2	Fused silica crucible.....	132
5.4.3	Process preparation	132
5.4.4	Process and working procedure.....	133
5.5	Conclusions.....	134
6	A vertically integrated production process.....	136
6.1	Production cost.....	139
7	Summary.....	141
8	Bibliography	142

List of Tables

Table 1.1:	General properties of silicon.....	1
Table 1.2:	Impurity concentration in different silicon grades	4
Table 1.3:	Silicon savings.....	14
Table 2.1:	Thermal and mechanical properties of silicon.	21
Table 2.2:	Target composition.....	23
Table 2.3:	Photovoltaic cell efficiency by material.	24
Table 2.4:	Electron properties in n-type silicon at 300 K.	32
Table 2.5:	Hole properties in p-type silicon at 300 K.	32
Table 2.6:	Parameters for mobility calculation.....	33
Table 2.7:	Lifetimes and diffusion lengths of holes minority carriers.	36
Table 2.8:	Lifetimes and diffusion lengths of electron minority carriers.	36
Table 3.1:	Quartz analysis from different sources	42
Table 3.2:	High purity quartz analysis from different sources	42
Table 3.3:	Typical low ash coal analysis	43
Table 3.4:	Typical ash analysis of low ash coal	43
Table 3.5:	Wood chips typical ash analysis	44
Table 3.6:	Production normative – material flow	47
Table 3.7:	Production normative – energy consumption	48
Table 3.8:	Worldwide photovoltaic silicon production capacity from 2004 - 2010.	49
Table 3.9:	Behavior of P, Al and Ca in the process developed by Hazanawa	52
Table 4.1:	Boiling points of silane.....	57
Table 4.2:	Segregation coefficients, k_0 , for selected elements in silicon	63
Table 4.3:	Fused silica crucible square type.....	88
Table 4.4:	Reactions for Si-B-O system.	91
Table 4.5:	Reactions between SiO_2 and [B].	92
Table 4.6:	Reactions among B-H ₂ O-O ₂ system.....	94
Table 4.7:	Annealing and leaching.	100
Table 4.8:	Vaporization time for $M_p(0) = 5$ ppmw silicon 1770 and 1820 K.....	105
Table 4.9:	The vapor pressure of elements.....	108
Table 5.1:	Electric arc furnace parameters.....	114
Table 5.2:	Chemical analysis of raw material for test in electric arc furnace.	115
Table 5.3:	Chemical analysis silicon produced in electric arc furnace.....	116
Table 5.4:	Chemical analysis of standard metallurgical grade silicon used for the experiments.....	116
Table 5.5:	Chemical composition of oxide mixture and ration alkalinity/acid.	117
Table 5.6:	Chemical analysis of initial silicon metal and silicon analysis after treatment with different oxide mixtures.....	118
Table 5.7:	Chemical analysis of metallurgical grade silicon.....	120
Table 5.8:	Chemical analysis of treated silicon metal within 1, 2 and 3 hours	120
Table 5.9:	Chemical analysis of metallurgical grade silicon before and after the gas treatment.	123
Table 5.10:	Chemical analysis of metallurgical grade silicon before and after vacuum treatment.....	125
Table 5.11:	Results from electron beam experiments.	128
Table 5.12:	The phosphorus reduction results compared to Silicon I versus time and temperature.	129
Table 6.1:	Quartz and carbon qualities and mass balance.....	136
Table 6.2:	Impurity mass balance calculation.....	137

List of Figures

Figure 1.1:	Silicon metal	1
Figure 1.2:	Czochralski ingot grows	4
Figure 1.3:	Float zone ingot grows	5
Figure 1.4:	Multi-crystalline ingot	6
Figure 1.5:	Amorphous silicon thin film photovoltaic cell	7
Figure 1.6:	Copper, Indium, Gallium, and Selenium (CIGS) thin film photovoltaic cell	7
Figure 1.7:	World energy consumption.....	8
Figure 1.8:	Energy demand by fuel type.....	9
Figure 1.9:	Production chain.....	9
Figure 1.10:	Silicon market demand.....	11
Figure 1.11:	Sun power cost reduction targets.....	13
Figure 1.12:	Development in wafer thickness.....	14
Figure 1.13:	Total primary energy supply from sunlight.....	15
Figure 2.1:	Crystal silicon planes.....	19
Figure 2.2:	Periodic table of the elements.....	20
Figure 2.3:	Schematic of a simple of simple conventional solar cell.....	21
Figure 2.4:	Doping with B and P dramatically improves its photovoltaic properties.....	22
Figure 2.5:	Impurity content of M-Si and required impurity content for SoG-Si.....	23
Figure 2.6:	Future yield – η of multifunction photovoltaic cells.....	24
Figure 2.7:	Best research photovoltaic cell efficiencies.....	25
Figure 2.8:	Material-quality contours of lifetime versus dopant concentration.....	26
Figure 2.9:	The three recombination mechanisms in silicon	27
Figure 2.10:	Resistivity relation versus ingot height.....	34
Figure 2.11:	Right proportion (P:B) and influence on resistivity versus ingot height.....	34
Figure 2.12:	Resistivity in chemical cleaned silicon doped with boron versus ingot height.....	35
Figure 2.13:	Change of resistivity by 0.075 ppmw phosphorus doping.....	35
Figure 2.14:	Change over from <i>p</i> - to <i>n</i> - type silicon.....	38
Figure 2.15:	Resistivity versus impurity concentration for Si at 300 K.....	39
Figure 3.1:	Drawing of a submerge electrode arc furnace for production of metallurgical grade silicon.....	40
Figure 3.2:	Ellingham - Gibbs diagrams of oxides.....	45
Figure 3.3:	Energy pattern in a submerged arc furnace.....	47
Figure 3.4:	General scheme of the two processing routes.....	48
Figure 3.5:	SOLSILC production process	51
Figure 3.6:	Elkem Solar production process	52
Figure 3.7:	The Photosil consortium and project organization.....	53
Figure 3.8:	Process flow of silicon purification.....	53
Figure 3.9:	Process flow of silicon purification made by Timminco	54
Figure 3.10:	6N production process flow.....	54
Figure 3.11:	Low temperature solidification refining of solar grade silicon using Si-Al solvent.....	55
Figure 4.1:	Schematic representation of the Siemens process.....	57
Figure 4.2:	Schematic representation of the Siemens reactor	58
Figure 4.3:	Schematic representation of the Union Carbide process.....	60
Figure 4.4:	Segregation coefficients	62

Figure 4.5:	Scheil model.....	64
Figure 4.6:	Phase diagram of impurities in silicon.	66
Figure 4.7:	Lever model of infinitely fast impurity diffusion.	66
Figure 4.8:	Phase diagram at low concentration of impurities in silicon.....	67
Figure 4.9:	Phosphorus reduction.....	67
Figure 4.10:	Boron reduction.	68
Figure 4.11:	Sample position in ingot and place where the chemical analyses were done.	68
Figure 4.12:	Scheil model for phosphorus and the test results.	69
Figure 4.13:	“Freezing tube”.	69
Figure 4.14:	Process of solidification for proving the Scheil model.....	70
Figure 4.15:	Silicon in the carbon crucible before melting.	70
Figure 4.16:	Cleaning level after the first step.	71
Figure 4.17:	Schematic presentation of the two-step process.	71
Figure 4.18:	Cleaning level after the second step.....	72
Figure 4.19:	Two stage process with the reuse of silicon.	72
Figure 4.20:	Two-step process with reuse of silicon and equations of the process.	73
Figure 4.21:	Calculation of two stage process with the reuse of silicon.....	74
Figure 4.22:	Result after the first freeze.	74
Figure 4.23:	Result after the second freeze.....	74
Figure 4.24:	Three step freezing process with reuse.....	75
Figure 4.25:	Stationary three step process with prescribed parameters and 16 unknowns.	76
Figure 4.26:	Stationary three step cleaning process by $f_S^1 = f_S^2$	77
Figure 4.27:	Stationary three step cleaning process $f_S^1 = 0.5$	78
Figure 4.28:	Freeze and unfreeze process cascade for cleaning (principle sketch).	78
Figure 4.29:	Impurity boron in phosphorus in the first stage of cleaning.....	79
Figure 4.30:	Impurity phosphorus - illustration of principles.....	79
Figure 4.31:	Relation between volume fractions and yield for boron ($k_B = 0.8$). ...	80
Figure 4.32:	Effect of boron cleaning.....	80
Figure 4.33:	Yield versus final boron concentration.....	81
Figure 4.34:	Effect of phosphorus cleaning.	81
Figure 4.35:	Yield versus final phosphorus concentration.	82
Figure 4.36:	Burton model of impurity concentration changes by solidification.....	82
Figure 4.37:	Si–P phase diagram.	83
Figure 4.38:	Solid solubility of phosphorus in silicon	84
Figure 4.39:	The phase diagram in low concentration of phosphorus.	84
Figure 4.40:	Bridgman process of crystallization.	87
Figure 4.41:	Block-casting process.....	88
Figure 4.42:	Mass ratio of B in slag (wt. % B) versus that in molten Si (wt. % B) plotted as a function of the slag composition expressed in mole fractions.....	90
Figure 4.43:	ΔG of oxides versus temperature for Si-B-O system (reacting gas: O_2).	92
Figure 4.44:	ΔG of reactions between SiO_2 and [B] versus temperature.....	92
Figure 4.45:	Partial pressure of B_xO_y versus temperature.	94
Figure 4.46:	ΔG of chemical hydrates versus temperature.	95
Figure 4.47:	Partial pressure of $B_xH_zO_y$ versus temperature.	96
Figure 4.48:	Main boron gaseous species.	97

Figure 4.49: Volatility of HBO(g) by reaction of water vapor with B dissolved in molten Si.	98
Figure 4.50: Silicon metal and insulation felt.	100
Figure 4.51: Grinding mill.	100
Figure 4.52: Crucible with molten silicon.	103
Figure 4.53: Vapor rate for $M_{Si}(0) = 2.81$ kg silicon and 2000 K.	104
Figure 4.54: Vapor rate for $M_P(0) = 2000$ ppmw silicon and 2000 K.	105
Figure 4.55: Vapor rate for $M_P(0) = 5$ ppmw silicon and various height of liquid. ...	106
Figure 4.56: The vapor pressure of elements.	107
Figure 4.57: Activities coefficient in relation to temperature.	108
Figure 4.58: Vapor-liquid phase equilibrium composition diagram of Si-P alloy. ...	111
Figure 4.59: The transport path.	111
Figure 5.1: The electric arc furnace.	115
Figure 5.2: Quartz and carbon in briquette form.	115
Figure 5.3: The copper crucible filled with the mixture of oxides and silicon before and after treatment.	117
Figure 5.4: The principle of boron removal with plasma torch.	119
Figure 5.5: Torch, Liquid silicon surface in contact with the plasma and solidified silicon at the graphite susceptor.	119
Figure 5.6: The experimental principle of boron removal with plasma.	120
Figure 5.7: Relation between the process time and the reduction of boron.	121
Figure 5.8: Drawing of the test equipment.	122
Figure 5.9: Schematic process.	122
Figure 5.10: Furnace construction and position of elements inside the furnace. ...	124
Figure 5.11: Schematic process of tests A and B.	124
Figure 5.12: Temperature profile of tests A and B.	125
Figure 5.13: Phosphorus reduction and metals segregation with electron beam technology in vacuum.	126
Figure 5.14: Vacuum chamber with electron beam gun on the top and the water cooled copper pan.	127
Figure 5.15: Trace of the electron beams for melting and keeping the silicon liquid.	127
Figure 5.16: Liquid silicon flows from the copper pan into the crucible.	128
Figure 5.17: Fused silica crucible with insulation (black).	128
Figure 5.18: Phosphorus reduction versus temperature for various time frames. ...	130
Figure 5.19: Phosphorus reduction.	130
Figure 5.20: Directional solidification furnace.	131
Figure 5.21: Furnace and fused silica crucible.	132
Figure 5.22: Fused silica crucible filled with solar grade silicon.	132
Figure 5.23: Resistivity versus ingot height.	133
Figure 5.24: Temperature profile for directional solidification.	133
Figure 5.25: Fused silica crucible with ingot, ingot and brick.	134
Figure 5.26: Photovoltaic cell made from the processed silicon.	135
Figure 6.1: Resistivity of theoretical calculation.	137
Figure 6.2: Vertically integrated process from quartz to solar grade silicon bricks.	138
Figure 6.3: Process simulation tool.	139
Figure 6.4: Processing costs of the production process.	140

List of Abbreviations

λ	Wavelength
E_λ	Photon energy
h	Planck's constant
c	Speed of light
E_G	Semiconductor band gap
τ_{Aug}	Auger-limit lifetime
C_{Aug}	Auger coefficient
τ_{SRH}	Shockley-Read Hall lifetime
τ_{Rad}	Radiative lifetime
N_A	Dopant concentration
X_S	Solid solubility of impurities
k_0	Segregation (distribution) coefficient
C_S	Solid solubility limit at the melting point
k	Boltzmann constant
L	Solubility
ΔS	Entropy change
ΔH	Enthalpy change
T	Temperature
J_n	Current density of electrons
q	Charge
u_n	Mobility
E	Electric field
k_n	Segregation coefficient of n-type impurities
k_p	Segregation coefficient of p-type impurities
n	Carrier concentration
p	Resistivity
N_a	Acceptors density
N_d	Donors density
L_e	Electron minority carrier diffusion length
u_e	Electron mobility
τ_e	Electron minority carrier lifetime
L_h	Hole diffusion length
u_h	Hole mobility
τ_h	Hole lifetime
N_P	Density of phosphorus
N_B	Density of boron
ρ_{Si}	Mass density of silicon
m_P	Mass of phosphorus atom
X_P	Phosphorus concentration in ppmw
X_B	Boron concentration in ppmw
ρ	Static resistivity
E	Magnitude of the electric field
J	Magnitude of the current density
R	Electrical resistance of the material
l	Length
A	Cross-section
σ	Conductivity

ΔG	Gibbs energy
k_0	Segregation coefficient
X_S	Concentration of impurities in the solid stage
X_L	Concentration of impurities in the liquid stage
T_L	Liquidus temperature
T_S	Solidus temperature
X_0	Initial concentration of the impurity
f_S	Volume fraction of solid phase
f_B	Coefficient of activity
p	Partial pressures
p^*	Vapor pressure
a	Activity
N	Molar concentration
p_A	Actual vapor pressure of component A
p_B	Actual vapor pressure of component B
a_A	Activity of component A
a_B	Activity of component B
p_A^*	Saturation vapor pressure of component A
p_B^*	Saturation vapor pressure of component B
N_A	Concentration of component A
N_B	Concentration of component B
γ_A	Activity coefficients of component A
γ_B	Activity coefficients of component B
β_A	Ratio of the concentrations of components in the two phases