Pyrometallurgy Pyrometallurgy ist the extractive metallurgy of metal ores by means of thermal treatments mostly by temperature above the boiling point of water and often by oxidation or reduction.

Recrystallization In metallurgy and crystallography, recrystallization describes the "healing" of lattice defects (which may be formed for example by forming processes like drawing or rolling) in the crystallites by new formation of the microstructure due to nucleation and grain growth. The reason of the decrease in strength due to recrystallization is the degradation of dislocations. Recrystallization occurs for metals and alloys at certain temperatures and over a certain time. It is often a a procedure which is done after forming processes, to get a "soft" metal.

Redox Reaction A redox reaction (more clearly: a reduction-oxidation reaction) is a chemical reaction in which one reaction partner transfers electrons to the other. In such an electron transfer reaction, therefore, a release of electrons (oxidation) by a substance and an acceptance of electrons (reduction) take place. For example the reaction of elemental sodium with water, leading to sodium hydroxide and hydrogen is a redox reaction:

$$2\,\mathrm{Na} + 2\,\mathrm{H_2O} \longrightarrow 2\,\mathrm{NaOH} + \mathrm{H_2}$$

In this case sodium is oxidized to the oxidation state +1 and hydrogen is reduced from +1 to 0. The theoretical driving force of the reaction can be estimated by the differences of the -> standard potentials.

Roasting Roasting is a process of heating a sulfide ore to a high temperature in the presence of air. It is a step in the processing of certain ores. During roasting often sulfur dioxide is released.

Secondary Production Secondary production means not only recycling of metals but also the production of metals from side reactions during the production of other metals. For example the production of lead from copper flue dust is a secondary production, but not recycling.

Semiconductors Semiconductors are solids whose electrical conductivity lies between that of electrical conductors ($>10^4$ S/cm) and that of non-conductors ($<10^{-8}$ S/cm). Since the border areas of the three groups overlap, the negative temperature coefficient of resistivity is another important characteristic

Metal	Density (g/cm3)		Metal	Melt. (T ^{o}C)
Beryllium	1.85		Lithium	181
Magnesium	1.74		Indium	157
Calcium	1.55		Sodium	98
Rubidium	1.53		Potassium	63
Sodium	0.97		Rubidium	40
Potassium	0.86		Gallium	30
Lithium	0.53		Cesium	29
			Mercury	-39

2.2. Redox Potentials of Non-Ferrous Metals and some Ions

ordered by decreasing potential (from noble to ignoble)

Metal	Ox. Form	Electrons	Red.	Volt
Gold (Au)	Au+	+ e− ⇌	Au	+1,69
Gold (Au)	Au^{3+}	+ 3 e− ⇌	Au	+1,50
Gold (Au)	Au_{3+}	+ 2 e− ⇌	Au+	+1,40
Chromium (Cr)	Cr^{6+}	+ 3 e− ⇌	Cr^{3+}	+1,33
Platinum (Pt)	Pt^{2+}	+ 2 e− ⇌	Pt	+1,20
Iridium (Ir)	Ir^{3+}	+ 3 e− ⇌	Ir	+1,16
Nickel (Ni)	NiO_2 + $2H_2O$	+ 2 e− ⇌	$Ni(OH)_2$+$2OH^-$	+0,98
Silicon (Si)	SiO_2 + 4 H^+	+ 4 e− ⇌	Si + 2 H_2O	+0,86
Palladium (Pd)	Pd^{2+}	+ 2 e− ⇌	Pd	+0,85
Mercury (Hg)	Hg^{2+}	+ 2 e− ⇌	Hg	+0,85
Silver (Ag)	Ag^{+}	+ e− ⇌	Ag	+0,80
Tellurium (Te)	Te^{4+}	+ 4 e− ⇌	Te	+0,57
Copper (Cu)	Cu^{+}	+ e− ⇌	Cu	+0,52
Copper (Cu)	Cu^{2+}	+ 2 e− ⇌	Cu	+0,35
Bismuth (Bi)	Bi^{3+}	+ 3 e− ⇌	Bi	+0,31
Copper (Cu)	Cu^{2+}	+ e− ⇌	Cu^{+}	+0,16
Tin (Sn)	Sn^{4+}	+ 2 e− ⇌	Sn^{2+}	+0,15
Hydrogen (H)	**2 H^+**	**+ 2 e− ⇌**	**H_2**	**0**
Tungsten (W)	WO_2+ $4H^+$	+ 4 e− ⇌	W+$2H_2O$	−0,12
Lead (Pb)	Pb^{2+}	+ 2 e− ⇌	Pb	−0,13
Tin (Sn)	Sn^{2+}	+ 2 e− ⇌	Sn	−0,14