TECHNICAL UNIVERSITY OF KOŠICE
Faculty of Materials, Metallurgy and Recycling

Comprehensive material research of Fe and Mn ores and assessment of possibilities for their reduction with hydrogen.

UMET ÚSTAV METALURGIE

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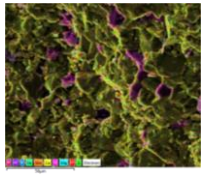
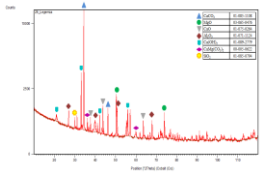
Methodologies for material research of Fe and Mn ores

chemical composition

physical properties

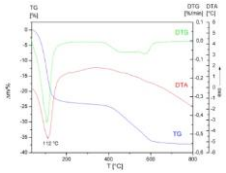


microstructure of grains



XRD composition

intervals of melting



DTG, DTA analysis

high – temperature of stability

thermodynamics models

reducibility

possibilities for reduction with hydrogen

Material research of Fe and Mn ores

The most suitable ores for pilot experiments of hydrogen reduction

iron ore

Carajas

Carajas contains easily reducible phase – hematite, high quality, high stability

manganese ore

Gabon

Gabon contains easily reducible phase – pyrolusite, high quality, high stability

Iron ore		 Krivbas (Ukraine)	 Rudomain (Ukraine)	 Carajas (Brazil)
Chemical composition (wt%)	Fe_{TOTAL}	62.25	58.20	65.23
	SiO_2	7.80	13.40	2.21
	P	0.03	0.06	0.05
	S	0.03	0.01	0.01
Mineralogical composition	XRD	hematite, hydrohematite, quartz	hematite, hydrohematite, hydrated iron silicate, cronstedtite, quartz	hematite, quartz
Melting point (°C)		1472	1453	1540

Manganese ore		 Burkina Faso (Africa)	 Gabon (Africa)	 Ghana (Africa)	 RSA (Africa)
Chemical composition (wt%)	Mn_{TOTAL}	52.05	53.09	37.73	34.32
	SiO_2	4.66	3.94	5.02	5.61
	P	0.07	0.04	0.08	0.03
Mineralogical composition	XRD	pyrolusite, manganite, pyrochroite, quartz	pyrolusite, quartz, magnetite	rhodochrosite, quartz	rhodochrosite, braunite, quartz, hematite
Melting point (°C)		> 1550	> 1550	1470	1410

SLOVAK RESEARCH AND DEVELOPMENT AGENCY

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