UNIVERSITY OF PANNONIA

COURSE DATASHEET

Semester:	2015/16/1
Course:	Solid State Chemistry III.
Code:	VEMKSIB144T
Responsible department:	Institute of Materials Engineering
Department code:	MKSI
Responsible instructor:	dr. Éva Makó Kristófné Dr.

Course objectives:

Structure of crystalline phase of raw materials and products used in silicate technology. Correlation between the crystal structure and physical properties. Colloid chemical foundation of silicate technological processes.

Course content:

Classification of silicates (Liebau's, Strunz's, Kostov's and Zoltai's classifications). Structure and properties of nesosilicates (C_3S, βC_2S, garnets). Application of garnets in colouring materials based on $ZrSiO_4$. Structure and physical properties of soro- and cyclosilicates (Sorosilicates formed during the Cement hydratation, cyclowollastonite, cordierite), production and applications of cordierite. The structure and physical properties of ino- and phyllosilicates (diopside, enstatite, mullite). Classification of clay minerals according to Stevens and Nemecz. Thermal decomposition of clay minerals. Structure and physical properties of tectosilicates. Modifications of SiO_2 at normal and high pressure. Stabilization of the modifications, correlation between the structure and physical properties of SiO_2 based glass-ceramics. Feldspars, zeolites, isomorphous substitutions in the feldspars, melting behaviour of feldspars, structure physical properties and applications of zeolites. Correlation between the crystal structure and physical (mechanical, electric, thermal, optical) and chemical properties of silicates. History of colloid chemistry. Definition, formation and breakdown of colloidal state. Definition and classification of colloidal difform and disperse system. Macromolecular and association colloids. Gels. Boundary phenomena. Adsorption at gas-liquid, liquid-solid, and gas-solid interface. Formation of colloidal dispersions by condensation and dispergation. Mechanochemistry. Aggregative, dissolution, and sedimentation stability of disperse systems. Capillary phenomena of porous systems. Rheology and optical properties of colloids. Emulsions, sols, and suspensions. Flotation. Breakdown of aerodisperse systems. Purification.

Requirements, evaluation and grading:

Attendance of lectures and practices

Required and recommended readings:

Smith, W.F.: Foundations of Materials Science and Engineering, Mc Graw-Hill, Inc., 1993 Flinn, R.A., Trojan,

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Required and recommended readings:

P.K.: Engineering Materials, Honghton Mcfflin Company, 1990 Lee, W.E., Rainforth, W.M.: Ceramic Microstructures Chapman ? Hall, 1994 Hinz, W.: Silikate I, II. VEB Verlag für Bauwessen, Berlin, 1970 Nemecz E.: Agyagásványok, Akadémiai Kiadó, Budapest, 1973 Juhász A. Z.: Általános és szilikátkémiai kolloidika I.-III Buzágh A.: Kolloidika I., II. Hunter, R. J.: Foundations of colloid science I.-II., Oxford University Press, 1995.