IRANIAN SOCIETY of CRYSTALLOGRAPHY and MINERALOGY

Vol. 18, No. 4, Winter 1389/2011

IRANIAN JOURNAL of CRYSTALLOGRAPHY and MINERALOGY

Crystal structure and phase transition in Sio_2 - K_2O - CaF_2 - CaO miserite glass ceramic System

M.T. Hamedani[*1], V.K. Marghoosian[2], H. SarPoolaky[2]

1-Faculty of Materials and Metallurgical Engineering, Iran University of Science and Technology (IUST) Tehran, Iran
2- Faculty of Mechanical Engineering, Tabriz University, Tabriz, Iran

(Received: 26/2/2010, in revised form: 30/6/2010)

Abstract: Miserite, as a type of calcium potasium silicate mineral, was characterized by J.D. Scott at 1975 in the form of a chain silicate structure according to $(K_{1.29}\square_{0.21})\left[Ca_{5.51}M^{3+}_{0.49}\right](Si_6(O,OH)_{15})(Si_2O_7)(F,OH)_2 0.29H_2O$ Formula. The primary cell parameters and the positioning of all atoms in the cell were characterized by scott and he also denoted that in this structure, some impurities such as Y^{+3}, Ce^{3+},… were substituted by Ca^{2+} as solid solution. Beal were synthesized this composition in 1999 by glass ceramic route and reported 235 MPa, 3.5 $MPa.m^{1/2}$ as bending strength an fracture toughness values of the products. In this research, the syntheses of miserite based compositions by glass ceramic rout were investigated. The results of DTA and XRD study showed that the synthesis of this composition is possible just by using of some additives such as Ce^{3+}. Also it is denoted that using of other additives such as Al_2O_3 and Be_2O_3 beside Ce^{3+} can promote the formation of miserite as major phase. The microstructure of this composition obtained as interlocked rods with 1 micron diameter and more than 20 micron length. Also it is dented that this structure can enhance the mechanical properties at the samples.

Keywords: *Miserite, glass ceramic, chain silicate.*

متن فارسی اصل مقاله از صفحه ۶۸۵ تا ۶۹۴ در این شماره به چاپ رسیده است.

[*]Corresponding author, Tel.:09127017806, Fax: (0411) 3356026, E-mail: M-hamedani-288@yahoo.com