Luminescence spectra of plagioclase (labradorite) from South Greenland

A.Çetin, R.Kibar and N.Can, Celal Bayar University, Faculty of Arts and Sciences, Department of Physics, 45140 Manisa-TURKEY, (somacetin@yahoo.com)

Minerals and materials can luminescence when they are exposed to an electron, X-ray, ion, or photon beam. Luminescence is generally associated with light in the ultraviolet (UV) to infrared (IR) region and can exhibit both broad and narrow band spectra. From the spectra it is possible to identify both the activators responsible for the luminescence and their charge states. Whatever the nature of the incident energy, energy cascades associated with the subsequent luminescence is often similar and hence different forms excitation/stimulation explore subtly different aspects of luminescence centres within materials. A large number of research groups routinely employ luminescence and optical analysis as a key macro and micro-characterization techniques in the study of minerals and materials

Results are presented for the time resolved Cathodoluminescence (CL), Optical Absorption (OA), X-Ray Diffraction Analysis (XRD) and SEM of plagioclase (labradorite) from South Greenland. CL spectrum of plagioclase exhibit three emission bands at around 443 nm in the blue region, 580 nm in the yellow-green region and 770 nm in the red-infrared (IR) region, which can be assigned to Al—O—Al or Ti^{4+} , Mn^{2+} and Fe^{3+} centers, respectively (Fig 1). The Optical Absorption spectra were measured using a Perkin-Elmer Lambda 950 spectrophotometer in the wavelength range of 200–800 nm. The Optical Absorption spectrum showed an absorption band centered at approximately 500 nm (Fig. 2).

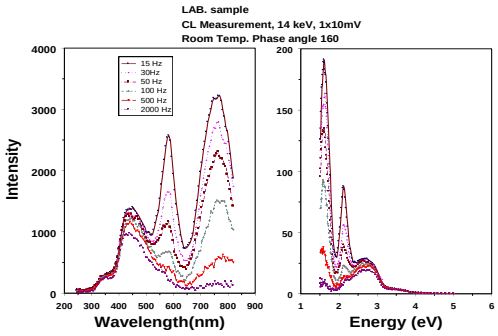

Fig.1 CL spectra for plagioclase at modulation frequencies ranging from 15 to 2000 Hz at room temperature

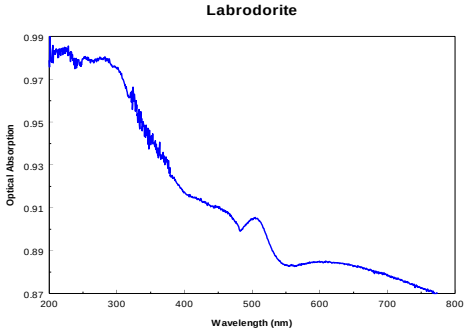

Fig.2 Optical Absorption spectrum measured at 300 K.

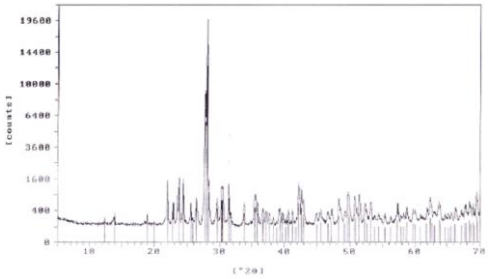

Fig.3 XRD spectra of plagioclase from South Greenland

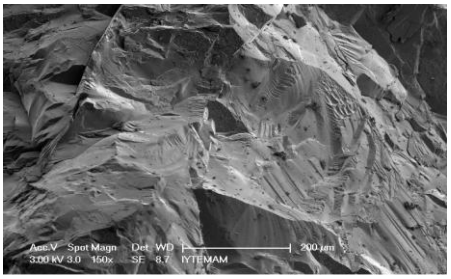

Fig.4 SEM image of plagioclase from South Greenland

References:

[1] Telfer DJ, Walker G (1978) Ligand field bands of Mn2+ and Fe3+ luminescence centres and their site occupancy in plagioclase feldspars. Modern Geol 6:199-210. **[2]** Huntley, D. J., Godfrey-Smith, D. I., Thewalt, M. L. W. and Berger, G. W. (1988) Thermoluminescence spectra of some mineral samples relevant to thermoluminescence dating. J. Luminescence 39, 123-136. **[3]** Finch, A. and Klein, J. (1996) EPR and the cathodoluminescence of alkali feldspars. In International Conference on Cathodoluminescence and Related Techniques in Geosciences and Geomaterials, Nancy, France, Abstracts, pp. 45±46.