Analysis of nanostructures consisting of the Al-pyrocatechol complex using spectroscopic ellipsometry

MARTINA FRANKE

Department of Soil Science, University of Trier, D-54296 Trier, Germany (s6mafran@uni-trier.de)

In this study, spectroscopic ellipsometry was applied by using the photon energy over the range of 1.2-5.4 eV to determine the optical properties n and k from thin films of nanostructures consisting of pure Al and the Al-pyrocatechol complex. In addition, the real and imaginary part of the dielectric function epsilon was determined. During the preparation, two types of mirrored glass were used being of different thickness of the Al film in order to examine the equality of the results. Thin films of the Al-pyrocatechol complex were synthesized by adsorption in a gas-solid phase at 50 °C in the presence of atmospheric pressure for a period of 21 days in total darkness. The modeling of the optical response from the analyzed surfaces resulted in two forms of absorption spectra which showed Al and the Al-pyrocatechol complex. In this calculation, five plots of absorption spectra were determined. At this stage, rough forms of the first spectra were transformed to a smooth form by using a smoothing-spline algorithm. The third spectra were calculated by applying a surface-excess function to eliminate the interfering optical response of Al. Concerning this matter, the second derivative of the surface-excess function was calculated and observed in the fourth absorption spectra. The fifth plot showed the reference spectra of Al. In the UV region of the metal-ligand spectrum, an absorption maximum appeared at 275 nm. Within the Vis region of the spectrum, ligand bands from the complex occurred with an absorption maximum of 525 nm. In consequence of the addition of OH auxochoms in the process of complexation, a rise of the chomophore system occurred causing an increase of the absorption intensity. Fine nanostructures of the Al-pyrocatechol complex were ascertained as a result of the spectroscopic ellipsometry.

Acknowledgement: Christoph Cobet and Norbert Esser, Institute of Solid-State Physics, Technical University of Berlin, Germany, is thanked for the glass mirrors and the spectroscopic ellipsometry.

[1] Franke M (2007) Geochim. Cosmochim. Acta 71 (15), Suppl. 293. [2] Franke M (2002) diploma thesis, Univer. of Trier, 187 pp. [3] Kelly M K et. al. (1993) Surface Science 285, p. 282-294.

Carbonatites age of the Tiksheozero massive (North Karelia, Russia)

FRANTZ N.A.[1], RODIONOV N.V.[2] AND LOKHOV K.I.[3]

[1, 3] Saint -Petersburg State University, St.Petersburg, Russian Federation, (nfrantz@mail.ru,)(Kirill_Lokhov@vsegei.ru)

[2] Centre of Isotopic Research, Russian Geological Research Institute (VSEGEI), St. Petersburg, Russian Federation, (nickolay_rodionov@vsegei.ru)

In recent years, a lot of new ages of the Tiksheozero carbonatite massive were obtained. Usually for investigation zircon and baddeleyite has been used.

Baddeleyite dates converge to the age of 1.99 Ga (Rodionov *et al*, 2009; Corfu *et al*, 2011). Age of zircon from carbonatites correspond 1970±5.7 Ma (Ivanikov, Frantz, 2002) and 1959±16 Ma (Rukhlov, Bell, 2010).

It is known that baddeleyites age are reflecting age of the melt crystallization, because of their minimum sensitivity to the overprinting processes. Metamict properties of zircon from Tiksheozero carbonatites do not provide correct estimation of the crystallization age.

Geochemical characteristics of zircons (Frantz *et al*, 2001, Tichomirowa *et al*, 2012) indicate their magmatic-metasomatic origin, leading to a disturbance of U-Pb isotopic system.

We obtained concordant baddeleyite U-Pb data corresponding to an age of 1997±11 Ma. (U–Th–Pb SIMS SHRIMP-II, 20 analysis of 11 baddeleyite grains were used.) Isotopic data on the subconcordant zircon-I (first generation) give exhibit 1992±13 Ma crystallization age . U-Pb data on Zircon-II (zircons overgrows on baddeleyite) and essentially discordant zircons-I can be interpreted as a discordia with parameters 2022±22 and 841±42 Ma. These data show, that zircons were not affected at the time of Svecofennian metamorfism (1764±41 Ma), which was find by isotopic data for major rock forming minerals of the Tikshozero rocks (calcite, phlogopite, amphibole), but suffered some loss of radiogenic lead at Neoprotherozoic event.

DOI:10.1180/minmag.2013.077.5.6