

Development of an Advanced Phase-Shift Interferometry to measure dissolution rate and phenomena of insoluble minerals

UETA, Shinzo^{1*}, SATOH, Hisao¹, UEDA, Akira², TSUKAMOTO, Katsuo³

¹Naka Energy Research Laboratory, Mitsubishi Materials Corporation, ²Graduate School of Division of Science and Engineering, University of Toyama, ³Graduate School of Science, Tohoku University

From the point of views of the safety of radioactive waste disposal, dissolution of bentonite as engineered barrier and/or rock system surrounding waste as natural barrier is one of the key issues. Nevertheless, the understanding of the dissolution mechanisms in dissolution of very insoluble minerals is still insufficient. Therefore, an advanced Phase-Shift Interferometry (PSI) was developed to resolve dissolution process on a molecular level. The advanced PSI is distinguished by the some features, such as white light source for illumination, large working distance of the object lens, and so on. It allows the direct, simultaneous, and high speed measurement of dissolution of minerals. This high speed and high resolution observation shorten the observation period, and decrease the influence of disturbance of experimental condition. These are strong advantages for understanding the dissolution mechanism. For example, biotite dissolution rate of the order of $1\text{E-}11$ mol/m²/s was measured in the period of 4 days to 20 days by means of conventional method. It was measured by means of the advanced PSI within 12 hours.

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