CURRENT RESEARCH AND DEVELOPMENT IN LAVORATORY FOR DEVELOPMENT OF ENGINEERING MATERIALS, FACULTY OF TECHNOLOGY OF KANAZAWA UNIVERSITY

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(1) Fundamental Studies on Alkali-Silica Reaction ACTIVE

The expansion of the mortars made with an opal aggregate, the properties of reaction products formed in the mortars and the process of their formation are investigated using the SEM, the EDXA analyser and microhardness measurements. The mechanisms of expansion of concrete due to the alkali-silica reaction have been clarified. Effects of various pozzolanic additives on alkali-silica expansion and their mechanisms are also explored. The effect of various chlorides on the alkali-silica expansion has been investigated. The chemical composition of pore solutions expressreed from the mortars is also analysed.

(2) Utilization of the Coal Burning By-Product as Construction Materials ACTIVE

This project aims at developing the effective utilization of coal ashes obtained in the process of coal burning as construction materials. The possibility of the utilization of coal ashes as a soil stabilizer, a fine aggregate and a pozzolanic additive for making concrete is explored. In this study, the strength development characteristics of the soils stabilized by coal ashes, the concretes made with the fine aggregate of coal ash and their microstructure are revealed by the SEM observation and mercury porosimetry. The durability of concretes made using coal ashes will also be examined. The application of coal ashes as a grouting material is being onvestigated.

(3) Durability of Glass Fiber Reinforced Concrete ACTIVE

In order to clarify the mechanism of the gradual reduction in the toughness and/or flexural strength of glass fiber reinforced mortar with time, microscopic features of the cement paste regions around glass fibers are investigated with the combined SEM-EDXA analyses and microhardness measurements.

(4) Synthesis of functional polymers and immobilization of bioactive substances. ACTIVE

Absorbents for proteins have been prepared by the modification of phenolic resins with gelatin. The modification reaction has been investigated under different conditions in detail, and the resins having higher protein-adsorption ability have been developed. In the case of enzymes, the thermal and storage stabilities are extremely improved by the immobilization on this resin. In addition, our resin can be expected to be applied to the separation of various bioactive substances.

(5) Studies on functional calixarenes ACTIVE

Calixarenes, which have a unique cylindrical structure, are novel host compounds to form inclusion complex with various potential guest molecules. We have been found that calixarene derivatives having oxyethylene unit show complexing ability for alkali metal cations. At present, the inclusion phenomena for neutral organic compounds are studied. When t-butylcalix [4] arene is recrystallized in a xylene isomer mixture, inclusion complex with p-xylene can be obtained selectively. Therefore, calixarenes will become useful tool for the separation of compounds which resemble each other in their physico-chemical properties. Studies on the polymer materials containing calixarene moeity are also progress.