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## INFLUENCE OF ADDITION OF AL COMPOUND AND GYPSUM ON TOBERMORITE FORMATION IN HYDROTHERMALLY TREATED CEMENT-BASED MATERIALS STUDIED BY IN SITU X-RAY DIFFRACTION

K. Matsui<sup>1\*</sup>, A. Ogawa<sup>1</sup>, J. Kikuma<sup>2</sup>, S. Matsuno<sup>2</sup>

<sup>1</sup>Asahi-KASEI Construction Materials Corporation

106, Someya Sakaimachi, Sashimagun, Ibaraki, 306-0493 Japan.

\*E-mail: matsui.kj@om.asahi-kasei.co.jp

<sup>2</sup>Analysis and Simulation Center, Asahi-KASEI Corporation

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### Abstract.

A hydrothermally treated cement-based material is widely used as a building material because of its high durability and fire resistance. It has been reported that both the quantity and quality of tobermorite ( $5\text{CaO} \cdot 6\text{SiO}_2 \cdot 5\text{H}_2\text{O}$ ) formed in the material affect the mechanical properties of these materials significantly. We have investigated the formation of tobermorite during the hydrothermal processing by in situ XRD analysis using high-energy X-rays from a synchrotron radiation source. The effects of Al and gypsum addition on tobermorite formation were studied. Acceleration of tobermorite formation by Al and gypsum addition was clearly observed. In the experiment on gypsum addition, the Avrami model was well fitted over almost the entire reaction period, and different exponent coefficients were obtained for the two systems with and without gypsum. The tobermorite formation mechanisms were discussed in these systems.