QCM technique for in-situ analysis of supersaturation in cooling crystallization

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Based on Quartz Crystal Microbalance (QCM) technique, an analytical method for the cooling crystallization such as crystal induction point, nucleation and growth was already developed with bare gold sensor in previous work. However, it still remained as a great challenge to analyze the supersaturation during the crystallization, which might provide fundamental information on the crystallization phenomena such as crystal nucleation and growth. Thus, in the present study, the QCM sensor was modified with 11-Amino-1-undecanethiol, hydrochloride (AUT) to prevent the crystal nucleation and the crystal attachment on the sensor and to detect the property change only in the liquid phase without a disturbance of solid particles. Using the AUT modified sensor to the cooling crystallization of sulfamerazine, thus, the supersaturation of the solution was measured by comparing with the solute-free solution. At the same time, the induction point of the crystal nucleation was detected.