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**On-Line Determination of Solution Supersaturation of Fast Precipitating Systems via SR ATR FTIR Spectroscopy**

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Recent advancements in the area of mid-IR fiber optics indicate an optimistic perspective for new designs of more flexible ATR sensors that could be utilized on large-scale industrial crystallization plants. Fiber optic sensors would enable remote sensing, increase flexibility and ease of use. A AgBrCl mid-IR fiber system with multiple sensors to monitor supersaturation across a batch crystallization vessel was commissioned and set-up for the first time during the experiments run at U2B beamline in August 2001. The size of sensing probes was small (diameter of probe head is less than 1 cm) so the probes did not act as baffles, thus minimizing the changes in the hydrodynamic conditions in the vessel, compared to the much larger Axiom Dipper-210 ATR immersion probe. The Fiber optic ATR immersion probe system was coupled to the external beam port of the Nicolet Magna FTIR spectrometer at U2B beamline. The work of the fiber system was tested with the Globar and SR IR radiation for the Monosodium Glutamate (MSG) crystallization from aqueous solution. In order to achieve best performance in a short measurement time the probes were coupled to a MCT fiber detector specially designed for the sensor. The ATR-fiber optic system showed very short measuring time. 1 to 2 scans were enough to achieve good S/N ratio. The short data acquisition time allowed taking spectra with less than 10s acquisition time and satisfying spectral resolution that is convenient for fast precipitation processes. A significant problem with the application of silver halide fiber probes was found to be their durability to the effect of the MSG. Distortion of the spectra was observed as a result of deterioration of the fiber (aging). The intensity of the spectra decreased significantly over a 6-month period and the peaks were found to become much less distinct. The fiber aging was due not only to the effect of the chemicals used, but the UV light as well. It must be noted that the spectra obtained with the SR were more strongly affected than those obtained with the Globar source. The experiments performed take forward improvement of sensing equipment for the on-line measurements of the concentration and supersaturation in batch crystallizers and the application of micro-probe sensor technology in particular. The drawbacks of the existing fiber optic system (aging, difficult alignment to the synchrotron light) have been shown and suggestions for improvements made. On-line measurement techniques based on fibers for IR light transmission and standard miniature ATR crystal sensors are recommended.