A NEW AREA DETECTOR FOR HIGH-SPEED AND HIGH-SENSITIVITY X-RAY DIFFRACTION ANALYSIS

TAGUCHI Takeyoshi
Rigaku Corporation, 3-9-12 Matsubara-cho, Akishima-shi, Tokyo 196-8666, Japan

A state-of-art semiconductor technology based area X-ray detector, namely D/teX-25, has recently been developed for high-speed and high-sensitivity X-ray diffraction analysis of materials. An XRD system equipped with a conventional 2-kW X-ray source and a D/teX-25 detector has been used to collect ultra-fast XRD patterns at a maximum speed of 160°2θ per minute, more than 30 times faster than a conventional speed of 5°2θ per minute with a scintillation or a proportional counter. This is particularly useful for dynamic and/or in-situ studies. The ultra high-speed data collection makes time-resolved experiments possible. An XRD system equipped with a D/teX-25 detector can be used also for in-line quality control when manufacturing and monitoring a very large number of samples in a day are required.

In addition to high-speed data collection, the D/teX-25 detector can provide two-dimensional X-ray diffraction data. Two-dimensional XRD data are known to have an advantage over conventional one-dimensional XRD data. This includes rapid detection/evaluation of preferred orientation and study of particle-size distribution in a sample. We have successfully used an XRD/DSC system equipped with a D/teX-25 detector for in-situ measurements of high-tech materials and pharmaceutical tablets. Information on phase changes with temperature and humidity, detection of minor phase and impurity, qualitative and quantitative phase analyses were rapidly obtained. Direct XRD measurements on pharmaceutical tablets using the D/teX-25 detector revealed phase inhomogeneous distribution inside the tablets. Examples of the XRD measurements with a D/teX-25 detector will be given.