An SEM investigation into the effect of particle morphology on the specimen preparation parameters of an automatic XRD specimen press

Avery, V.[1]

[1] John de Laeter Centre, Curtin University, Perth, Australia

Good specimen preparation is an essential component for obtaining high-quality powder X-ray diffraction (XRD) data for quantitative phase analysis (QPA). A common factor contributing to poor specimen preparation is human error. The use of an automated specimen press is expected to improve the accuracy of QPA by improving specimen preparation reproducibility.

In this study, we investigated the effect of particle morphology on the specimen preparation method for QPA using a customised automatic specimen press for XRD. Scanning electron microscopy (SEM) was used to characterise the specimen surface morphologies of four sample types (corundum, aluminium oxide, iron ore, and kaolin). The sample particle morphologies ranged from platy to circular shaped. The effect of specimen press operating parameters, including packing pressure, packing time, and surface finish, on the surface morphologies were investigated. Comparative SEM analyses of the surface morphologies using conventional manual preparation techniques such as the side-tapping method were also conducted. Diffraction analysis showed that using a combination of low packing pressure and increasing the surface roughness gave more accurate results.