

Application of FTIR imaging for quantitative visualization of sulfate and nitrate in PM2.5 collected in Asian cities

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Transboundary transport of fine particulate matter (PM2.5) is a major environmental issue in East Asia, yet rapid methods for characterizing its chemical composition remain limited. In this study, Fourier transform infrared (FTIR) imaging was applied to visualize and quantify major inorganic components of PM2.5 collected in Beijing, Seoul, and Tokyo. Sulfate and nitrate were quantified directly on filter samples without chemical pretreatment and validated against ion chromatography measurements. FTIR imaging revealed pronounced spatial heterogeneity of inorganic aerosols and a clear concentration gradient among the three cities (Beijing Seoul Tokyo), reflecting regional emission intensity and atmospheric transport influences. These results demonstrate that FTIR imaging provides a rapid, non-destructive approach for visualizing transboundary PM2.5 chemical signatures, offering new opportunities for regional air quality assessment and monitoring.

キーワード : PM2.5、FTIR イメージング、硝酸イオン、硫酸イオン、部分最小二乗法

Keywords: PM2.5, FTIR imaging, Nitrate, Sulfate, Partial least squares regression