

UTILIZING SMALL ANGLE X-RAY SCATTERING TO UNDERSTAND MATERIAL FAILURES AND IMPROVE MATERIAL LIFETIME

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During development, the Kansas City National Security Campus focuses on advancing candidate processes for producing materials at the laboratory scale into a larger manufacturing environment. Many materials produced and manufactured at Kansas City exhibit failure modes as a function of material and/or process that are not well understood. More over, the current analytical techniques used to monitor material performance probe bulk and macroscopic properties and are limited in providing quantitative structural/morphological information especially when projected for the lifetime/aged performance over time.

This presentation will discuss the use of small angle x-ray scattering (SAXS) to quantitatively probe morphological changes of various feed- stock materials to investigate material shelf life, recyclability, and diagnosing failure mechanisms. Structural information obtained from SAXS provides insight into structure-morphology-process-property relationships by directly probing meso- and nano-scale morphological features; this information is crucial toward understanding feedstock reliability, process optimization, and elucidating aging and material failure mechanisms. This presentation will review the strategy associated with implementing SAXS early in the development process to assist in directing and focusing efforts on the 'right' materials and technology processes.

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