

Large field-of-view scanning SAXS of mammalian cells

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X-ray imaging has been established as a complementary method besides to electron microscopy and visible light fluorescence microscopy for studying biological cells. In this context, scanning small angle X-ray scattering provides overview images of whole cells in real space as well as local, high-resolution reciprocal space information, rendering it suitable to investigate subcellular nanostructures in unsliced cells. However, this gain in information is at the expense of high dose, therefore the risk of radiation damage. At the same time, one persisting challenge in cell studies is achieving high throughput in reasonable times. To approach both challenges in parallel, we use a fast scanning mode to image hundreds of cells in a single scan. We suggest a way to deal with the vast amount of data thus collected, including a segmentation procedure and three complementary kinds of analysis, i.e. characterization of the cell population as a whole, of single cells and of different parts of the same cell. Our results show that short exposure times, which enable faster scans and reduce radiation damage, still yield information in accord with longer exposure times.