(invited) X-ray spectroscopy using low temperature detectors

After several decades of development, a significant amount of the effort in low temperature detectors (LTDs) is concentrated on deploying real-world experiments. This has resulted from a great deal of basic detector physics performed by several generations of students, post-docs, and researchers. One of the most fruitful applications of LTDs is in non-dispersive x-ray spectroscopy. LTD x-ray spectrometers are broadband, efficient, moderately high-resolution, and can handle moderately high count rates. However, they require significantly more power, mass, and infrastructure compared to traditional solid state x-ray spectrometers, and cannot achieve, at least at low energies, the resolving powers achieved with dispersive spectrometers. In several fields, however, LTDs have or will make a significant contribution. In this review, we will discuss x-ray spectroscopy in general, the fields of science where LTDs are making a significant impact, and some of the current and near-term LTD spectrometers.