Considerations on the capabilities of ID20 X-ray Raman spectrometer

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We describe selected specific aspects of the ID20 X-ray Raman spectrometer [1] starting from its design goals and current capabilities. The spectrometer has 72 spherically bent analyzer crystals arranged in six modular groups of 12 analyzer crystals each for a combined maximum flexibility and large solid angle of detection. Each of the six analyzer modules houses one pixelated area detector allowing for X-ray Raman scattering based imaging ("direct tomography") [2] and efficient separation of the desired signal from the sample and spurious scattering from the often used complicated sample environments.

Figure 1: ID20 XRS spectrometer at the front page of Journal of Synchrotron Radiation (March 2017 issue)

Numerous optimisations were done in obtain the geometry of the ID20 spectrometer. The spectrometer design was a development from the previous design with 9 crystal analyzers [3]. The development included the optimization of the versatility of scattering angles, imaging [2], luminosity as well as resolution [4]. The large number of the analyzers was an ambitious goal but the modular design made it feasible. Several steps were made in order, e.g., to improve the crystal quality [5] and to improve the spatial resolution in direct tomography [6]. A few selected applications will be presented.

References

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