s7.m1.o1 **Technical Advances for Time Resolved Studies in Materials Sciences.** H. Graafsma. *European Synchrotron Radiation Facility, BP 220, F-38043 Grenoble Cedex; France.*
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In the last century X-ray crystallography has been extremely successful in elucidating the structures of thousands of compounds. These structures have helped us to understand not only how the " world is built" but also, to a certain extend, how it functions. This last point mainly through systematic investigations of structure-function relationships. However, more and more often X-ray crystallography is used to study dynamic processes in-situ. These processes range from polymerization to high temperature synthesis, from chemical reactions in the solid state to recrystallization of metals and from photo-activation of proteins to phase transitions. Most of this time resolved research has become possible due to new developments in instrumentation, including sources, optics, sample environment and detectors.

- The sources have shown probably the most impressive development. The third generation synchrotron sources have given an increase in available flux of a few orders of magnitude, and recent developments in insertion device technology have shifted the energies to the 100 keV regime, opening up possibilities to study absorbing samples, in heavy sample environments.
- Developments in optics have followed pace with the source developments, with new cooling schemes in order to handle the increased flux. But more importantly optics for micro-focussing has become available, allowing to focus high energy beams down to a few microns.
- Sample environments are increasingly adapted to the smaller and smaller samples used. Also due to the high flux and high energies available at synchrotron sources different materials can be used opening new possibilities to studied processes inside complicated and "real world" sample cells.
- Detectors form another area where dramatic improvements have been made over the last years. It is fair to say that area detectors have revolutionized the X-ray diffraction world, furthermore, they have been absolutely crucial for the development of time resolved X-ray diffraction.

Recent developments in the various areas will be discussed and corresponding examples of research will be given.