01-Instrumentation and Experimental Techniques (X-rays, Neutrons, Electrons)

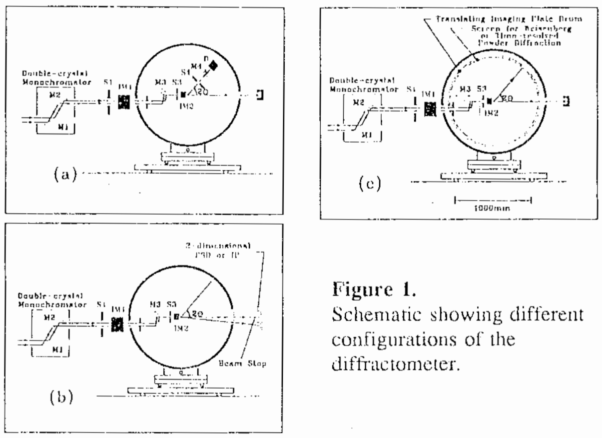

Figure 1. Schematic showing different configurations of the diffractometer.

PS–01.05.05 CATION DISTRIBUTION IN ZN-OXIDE SPINELS. By W. Schäfer[1], G. Will[2] and J. Gal[2], [1]Mineralogical Institute, University Bonn, Neutron Diffraction Group KFA Jülich, Bonn, Poppelsdorfer Schloß, 5300 Bonn, Germany; [2]Ben Gusion University, Beer Sheva, Israel.

The cation distribution in 4 compounds: $ZnAl_2O_4$, $ZnFe_2O_4$, $TiZn_2O_4$ and $SnZn_2O_4$ has been determined by neutron diffraction. Part of the investigations were done by conventional monochromatic powder diffraction at the FRJ-2 reactor in Jülich, part by TOF-measurements at the spallation sources ISIS. In both cases a position sensitive linear detector has been used.

The diffraction measurements were preceded by Mössbauer studies, which yielded contradicting results. The question arose whether the compounds crystallize as normal spinels or as inverse spinels. Only neutron diffraction with sufficient differences in the scattering lengths between Zn and the other cations will give the proper result.

The analysis was done by the Two-Step-Method with first a profile analysis and profile fitting yielding intensities for each reflection. The actual analysis and the cation distribution was then done with the POWLS least squares/program. Procedures and results will be shown.

01.06 – Open Commission Meeting on Neutron Diffraction – Complementarity of Neutron Sources

OCM–01.06.01 SCIENCE FROM PULSED SPALLATION NEUTRON SOURCES. By J L Finney, ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon, OX11 0QX, UK.

Conventional wisdom has it that pulsed neutron sources should be used when high energy and high momentum transfer is needed. This advantage over continuous reactor sources arises from the presence in the under-moderated spectrum of a significant high energy, low wavelength component, and facilitates high energy excitation studies and access to high scattering vectors. The time structure of the neutron pulse, however, allows a wide range of science to be performed that would be difficult, inefficient, or impossible on continuous sources. These advantages include very high resolution in both space and time, measurements over wide dynamic ranges of both energy and momentum transfer, the exploitation of fixed scattering geometries, and very low backgrounds.

These advantages have been exploited to great effect in areas of interest to crystallographers. Examples include the structure solution and refinement from powder data of systems for which single crystals were previously required, the detailed exploration of diffuse scattering, and the simultaneous measurement of both structure and dynamics in changing systems. Again contrary to conventional wisdom, pulsed sources are powerful sources of cold neutrons, and examples will be given of structural work exploiting long wavelength neutrons.

Although pulsed sources are relatively young, they have developed rapidly and are now established as powerful sources which have particular strong advantages. They are also capable of further development, as witnessed by proposals in both Europe and the USA for new sources up to 30 times the power of the ISIS source in the UK.

OCM–01.06.02 PULSED NEUTRON SOURCES AND STEADY REACTOR SOURCES By Y, Endoh, Department of Physics, Tohoku University Aramaki Aza Aoba, Aoba ku, Sendai, 980, Japan

We have argued for a long time the necessity of the complimentary usage of both steady and pulsed neutrons for condensed matter science in particular. In early days, we have developed pulsed neutron scattering techniques by carrying out experiments at the electron lineac facility of Tohoku University. Pulsed neutrons has been delivered since the late 60′s. In 1981, the first pulsed spallation neutron beam was delivered at the National Laboratory for High Energy Physics (KEK) in Japan after three year′s construction of this neutron facility, KENS. It was once the most intense and also the first full scaled pulsed neutron facility in the world. Since then KENS has been improved by the renewal of the spallation target as well as intensifying the proton accelerator, but it is a far small scaled facility compared with the world biggest neutron facility of ISIS at the Rutherford Appleton Laboratory.