**Box 1.** Methodology used for TKDL

Slokas from ayurvedic texts are first identified. Each sloka is read and converted into structured language using Traditional Knowledge Resource Classification (TKRC). TKRC is innovative in itself. The TKRC classification has been evolved for about 5000 subgroups as against one group in the International Patent Classification (IPC) for traditional knowledge. The TKDL portal would be based on XML standards and would be platform-independent. The codes for each sloka are fed into a data entry screen and also saved on the database. Computer-savvy ayurveda experts carry out the data entry. These are then decoded in different languages. The ayurvedic formulations can be presently decoded in English, French, German, Hindi, Japanese and Spanish. In future, it would be available in 20 foreign languages and all Indian languages. The decoded format of the formulation is easy to read and understand, even by the layman.

The web version of TKDL would include a web-based search interface. This would provide for a full text search and retrieval of traditional knowledge information on IPC and keywords in multiple languages. TKRC would be an integral part of TKDL, and would provide a background on ayurvedic concepts, definitions and scientific basis of Indian systems of medicine. In addition, it would carry information on practitioners, hospitals and dispensaries. There are several search features incorporated in the format.

According to V. K. Gupta, Director of National Institute of Science Communication, the TKDL software developed in-house does not do transliteration but it does smart translation. Once abstracted, data from the slokas are converted into several languages using unicode meta data methodology. The software developed can perform smart translation of botanical names and ayurvedic descriptions from traditional terminology into modern terminology. Examples of this are 'Kumari' to 'Aloe vera', or 'Mussorika' to 'small pox', etc.

'Kumari', 'Mustaka', 'Tamraparna', 'Garjara', 'Atasi', 'Jambira', 'Kharbuja'. The findings revealed that out of the 762 patents on medicinal plants studied, 360 of them could be characterized as traditional.

There has been international acceptance of TKDL. Recently, the World Intellectual Property Organization (WIPO) constituted a group of members from USPTO, China, Japan, European Patent Office and India for discussing the findings of the TKDL Task Force. The group presented their views at the International Patent Classification (IPC) Union meeting in February this year. The outcome is to create a new sub-class for TKRC in IPC and link TKRC with ayurveda. India's TKDL database has also been selected for a pilot study by 170 member states of WIPO. India presently is not a member of the IPC Union.

When completed, TKDL would help patent examiners for easy retrieval of traditional knowledge-related information, thus avoiding the possibility of granting patents to unoriginal inventions. Further, a review process of patents already granted in light of the TKDL database would help in cancellation of some patents.

**Nirupa Sen**, 1333 Poorvanchal Complex, J.N.U. New Campus, New Delhi 110 067, India (e-mail: nirupasen@vsnl.net).

MEETING REPORT

# Neutron scattering*

Some of the previous conferences in this series were held at Oxford (ICNS91), Sendai (ICNS94) and Toronto (ICNS97). ICNS 2001 covered a broad range of topics, including recent developments in neutron sources, the techniques of neutron scattering and their application to physics, chemistry, biology, material sciences and industry.

The inauguration by the Bavarian States Minister for Science, Research and Arts implied a strong political support to neutron-scattering activities in Germany. Almost 750 registered participants represented about 10% of the world community of neutron experimentalists. This included 73 from the Asian–Australian region and ten from India. A total of 978 papers were scheduled with ten plenary talks, 135 oral papers in four parallel sessions and the rest as posters.

There were four plenary talks on new neutron sources. These covered the American, Japanese and European spallation neutron sources planned for the years 2006, 2006 and 2010, respectively, and the German FRM-II (2001). T. E. Mason (Oak Ridge, USA) showed impressive photographs of the ongoing construction activity of what would be one of the most intense neutron sources. S. Ikeda (Ibaraki, Japan) claimed their SNS, which

*A report of the International Conference on Neutron Scattering (ICNS) 2001 held at Technical University, Munich (the site of the thermal neutron reactors FRM (1957) and FRM-II (2001)) during 9–13 September 2001.

has been approved, would be 1.2 times as intense as the American SNS. D. Richter (Julich, Germany) indicated that the European SNS would be the third generation neutron source limited only by the thermal shock at the spallation target, and its various specifications are being evaluated. W. Glaser (Munich) informed that the FRM-II would have the maximum neutron flux to power ratio ($7 \times 10^{14}$ n/cm$^2$/s at 20 MW), and has optimally located cold and hot neutron sources and neutron guides. The first generation of the instruments at FRM-II is presently awaiting the neutrons.

Three talks reviewed the continental existing facilities (B. Cywinski on Europe, J. White on Asia–Australia, and J. Rhyne on America). Europe has the largest neutron community, about 4500 strong. The experimental activity is distributed as ILL (21%), ISIS (17%) and the rest at regional reactors. There were separate regional meetings. In the Asian–Australian regional meeting, several invited presentations were made by Australia, China, India (S. L. Chaplot, BARC), Korea, Taiwan and Japan on the relevant facilities and collaboration programmes. Australia, Canada and China had plans to build new reactor facilities. An Asia–Oceania Neutron Scattering Association was proposed to be formed soon.

Other plenary talks covered neutron scattering in biology (G. Zaccai, ILL, France), magnetic excitations in metals and superconductors (S. M. Hayden, Bristol, UK), polymeric fullerides (H. Schober, ILL, France) and neutron diffraction for engineering applications (T. M. Holden, Los Alamos, USA) amongst other topics. Traditionally, the studies on dynamics of atoms and molecules in solids and liquids are less abundant due to difficulties in data collection and analysis. The role of dynamical information in characterizing the biological activity and polymer topology was notable and interesting. The talk on biological applications revealed a significant enhancement in the anharmonicity of certain thermal vibrations above 220 K, which might be related to a significant biological activity above that temperature. In case of polymeric fullerides, the vibrational spectra were shown to provide sufficient information to characterize the polymer topologies, which would be otherwise very difficult to obtain through direct structural analysis from diffraction experiments. This shows how the environment around a hydrogen atom can be easily characterized by the vibrational frequencies. In another talk, A. Zeludev (BNL, USA) discussed about a quantum phase transition in a one-dimensional spin chain from a spin solid to a liquid, and observation of 'spinons' involving domain-wall soliton propagation by inelastic scattering. The talk on the industrial applications emphasized the possibility of measurement of *in situ* strain response to applied stress in industrial alloys, and revelation of the various modes of deformations, such as slip and twinning, as also mapping of macroscopic stress fields.

The various topics and the number of contributed papers were as follows (numbers from India are in parentheses). Advanced neutron sources, 15; Neutron instrumentation, 202 (3); Soft condensed matter, 107 (3); Magnetism, 240 (6); Materials science, 247 (10); Biology, 39 (2); Chemistry, 56 (4); and Industrial applications, 54 (1).

The papers from India covered almost all the broad topics, and included two oral papers. These were on (i) the origin of negative thermal expansion in zirconium tungstate by high-pressure inelastic neutron scattering (Mittal, Chaplot, Schober and Mary), and (ii) the first realization of Bonse-Hart angular profiles from multiple Bragg reflections (Wagh, Rakhecha and Treimer). Some papers related to instrumentation that included reports on new neutron spectrometers at the Dhruva reactor, namely the double crystal-based small-angle scattering and spin-echo spectrometers, and data analysis in reflectometry. A fairly large number of papers on materials science, including soft condensed matter comprised of studies on micelles, porous rocks, manganates, oxide glasses and minerals, carried out using small- and large-angle diffraction, and inelastic scattering. Quasi-elastic scattering studies from molecular motions in zeolites and porous materials were also reported. So also papers on biological applications were presented by Indian scientists, which included studies on hydrogen bonding and micelle formation in protein–detergent complexes.

A number of special topics were highlighted in the conference. Particularly notable were the contributed talks in the sessions on low dimensional and quantum spin systems, materials in motion, unusual material states, perovskites, high-$T_c$ superconductors, polymers and organic molecules, biological applications, simulations for optimization of instruments, industrial applications, instrumentation and complementary X-ray scattering. The role of software in presenting end-user information was noted to be very important, particularly in industrial applications, as also in most experiments which tend to be data-intensive at modern neutron sources. Some other developments may be noted here. Neutron resonance spin-echo spectroscopy now allowed precise measurement of the phonon line width variation with temperature in lead. High-$T_c$ superconductors continue to be of interest, in which new evidence of involvement of phonons is revealed by inelastic scattering. Large isotope effect was reported in some high-$T_c$ compounds, while the phonon anomalies in YBCO were shown to be not related to the dynamic charge-stripe order.

The apparent trends in the experimental facilities are towards very large instrumentation, sophisticated sample environments and high neutron flux facilities employing various effective features, e.g. several hundreds of position-sensitive neutron detectors, super-mirror guides and use of long beam paths. Overall the proceedings of the conference reflected a vibrant present and promising future for neutron scattering research worldwide, with a continued emphasis on basic research, while several new applications are coming up.

**S. L. Chaplot**, Solid State Physics Division, Bhabha Atomic Research Centre, Mumbai 400 085, India (e-mail: chaplot@magnum.barc.ernet.in).