However in the case of a highly defective matrix, mostly its defect rather than the precipitates will be revealed with this method.

Here we show that nanometer-sized precipitates (shown in circle) of atomic number higher than those of surrounding crystalline/amorphous matrix can be clearly revealed in a conventional microscope by high angle centered dark field (HACDF) imaging after minimizing the diffraction contrast. The effect is similar to that of z-contrast STEM, albeit with a spatial resolution limited to 3-4 nm. In our studies cross sectional samples for TEM examination were prepared from multilayed sample of NbC/Si (10 layer pairs) on silicon substrate. Mechanical polishing, dimpling and low angle Ar-ion milling were used. Microscopy was carried out using Philips CM200 equipped with W cathode operated at 200kV. Figure A.6.1 shows the bright field image of the NbC/Si multilayer. High angle dark field image was obtained by using one of the diffraction spot. For z-contrast imaging, sample was tilted to such an extended that sample does not remain in the Bragg condition thus eliminating the diffraction contrast. Adjacent figure shows the z-contrast imaging of the same region from where bright field image was obtained. Dark band is due to the NbC and light bands are from Si. Dark bands contain some dark patches, which shows the presence of precipitate of NbC and Si in nanometer scale. These precipitates are shown in the circle. The chemical sensitivity to atomic number differences between precipitate and matrix is about 14.

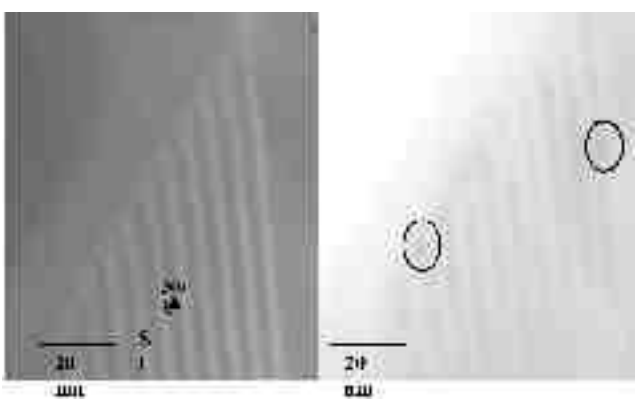


Fig. A.6.1 *Cross sectional TEM bright filed image of NbC/Si soft x-ray multilayer. Adjacent micrograph shows the Z contrast image of the same region.*

Contributed by:
A.K.Srivastava; sarvind@cat.ernet.in, M.H.Modi, G.S.Lodha and R.V. Nandedkar

Infrastructure

Computer Centre

Commissioning of high throughput cluster - Nalanda

32 node cluster 'Nalanda'was reconfigured with CONDOR clustering software to optimize parallel and sequential jobs. Currently each node has Pentium IV 2.8 GHz processor with 2 GB RAM. Intel Fortran, lf95, Absoft Fortran 90/95 compilers and parallel library MPICH for each of these compilers, are configured on the cluster. Math kernel library, SCALPACK, BLAS, CBLAS libraries are also configured on this cluster.

Many application programs like ADF (Amsterdam Density Functional - a Fortran program for calculations on atoms and molecules), WIEN97 & WIEN2K (computation of electronic structure of solids within density functional using Linearized Augmented Plane Wave (LAPW) method) and CPMD: Car-Parrinello Molecular Dynamics - Electronic Structure and Molecular Dynamics Program are successfully ported and running on the 32 node cluster. Transport software package (a computer program used to design charged particle beam transport systems) of version 1_5a for linux was also configured on the cluster with check-pointing facility.

Upgradation of computing infrastructure

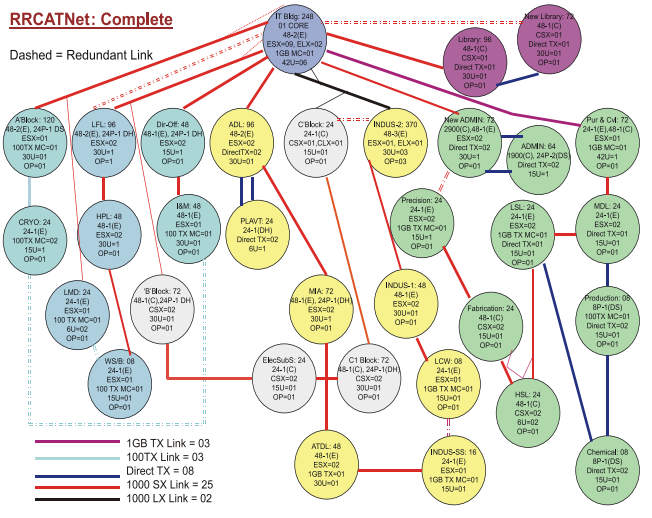
A high end computing server (Chi) based on Quad Alpha 21264 RISC processors (1.25 GHz and 16 MB L2 cache, 8 GB RAM) , two Xeon based servers (Beta, Gama) with (2x3.6 GHz processors, 2 MB L2 cache, 4 GB RAM) and one Itanium2 based server (Epsilon) with (1.6 GHz processor, 9 MB L3 cache and 8 GB RAM) were commissioned and released to the scientific computing users.

Quad Alpha Server is a HP ES45 series server with Fort (Fortran90) compiler, Ladebug debugger, Compaq 'C' compiler, Compaq math libraries (cpml, cxml) and Parallel library MPICH version 1.2.7. Beta server is configured with Red Hat Linux 9, lf95, Absoft fortran 90, Intel fortran & 'C' compilers, Intel debugger, Math Kernel Library, Nag Fortran library and transport package. Gama server is configured with 64-bit Red Hat Enterprise Linux version 4.0, 64 bit compilers-GNU Fortran 95, Intel fortran & 'C', Intel debugger and Math Kernel Library.

Epsilon server is configured with 64-bit Red Hat Enterprise Linux version 3.0 , 64 bit compilers - Intel fortran & 'C', Intel debugger and Math Kernel Library.

RRCATNet planning, expansion and upgradation

Work related to Phase III of OFC networking is completed. Phase III of the OFC networking will provide physical media level redundancy to each and every building. The recovery time in case of single media failure is expected to be within 50 milli seconds.

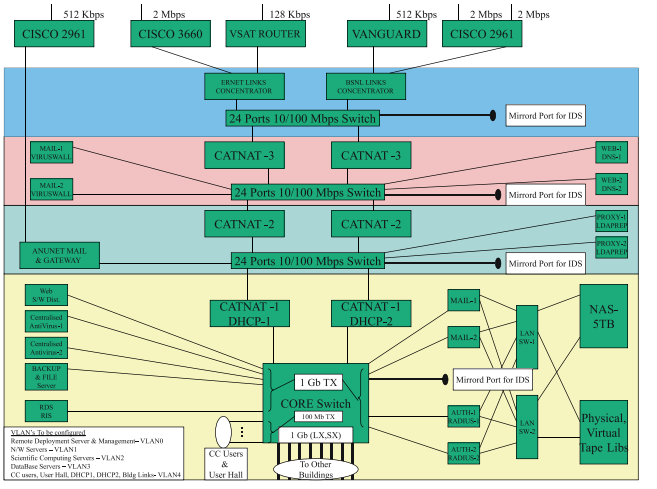


OFC Rings-Same color building groups in one OFC ring.

Internal Cabling work along with connectorization of 370 node network at Indus-2 was completed. Connectorization (160 cores on 10 segments) work, installation of 23 number of racks, installation of 250 node internal network at IT building and 16,8,7 node internal networks at Cryogenics , Guard House and Glass Blowing buildings respectively was completed.

RRCAT data Center

Like any other major R&D organization a customized data center has been envisaged at our Centre also. The design of the data center has been completed and various components have been integrated together. The main design criteria for the data center is to provide reliable, secure and scalable IT services to the scientists and engineers at RRCAT. The data center is implemented using dual components and dual access channels. This will ensure that single component / single access channel failure does not affect the functioning of the data center. A four layered security grid - with firewalls at each level - depicted in figure-2 by four different colors have been formed for securing the Intranet at RRCAT.



Logical layout of RRCAT data centre.

Email and Internet access setup

New Email servers for Internet/Intranet access have been commissioned with user data backup facility on NAS and increased user area. This server is integrated with Data Center. Two channels, with duplicated components have been setup for Internet access. This helps in increasing the uptime of the Internet access services. Centralized LDAP based authentication server, Anitivus and Antispam facility has also been configured on the new setup.

Anunet email access

RRCAT hosts the Anunet Email server with necessary portal for access by other DAE units. DAE HRMIS Services have been integrated over Anunet data channel. Seismology related data is also transmitted over secured Anunet channel. To take care of exigencies arising due to the single server failure, a duplicate email server was setup and necessary provisions were made to restart the services within few minutes of failure detection.

LFC Database lookup service

Computer Centre is working on a project to develop software for LFC based Database Lookup Service for CERN under DAE-CERN collaboration. LFC (LCG File Catalogue) is a high performance file catalogue, which supports Oracle/ MySql as database backend. It stores the logical and physical mappings of a file.

The LFCLookupService is a plugin library responsible for logical-physical mapping and for providing the list of possible replicas based on logical service name,

authentication method and access mode. The lookup is done from LFC server. A set of LFCDbLookupService administrating tools API were developed for the management of mapping information stored in LFC. These command line tools are implemented using LFC APIs for adding, removing, listing the replica entries for specified logical connection string and to export the replica entries of a logical connection string into XML file.

Unit testing and Integration testing programs were written for testing the connection and authentication service and running the test for lookup of replicas from LFC Server. Also Performance Analysis was carried out for lookup time vs Server load.

RRCAT Web site enhancements

The change of name of our center from CAT to RRCAT was affected in all the web pages served from our web server. Hindi web pages have been developed and added to the website. These pages have been developed using Microsoft Web Embedding Fonts Tool (WEFT) so that the users can view the Hindi pages without downloading any fonts on the client machine. Other significant enhancement has been the design of web pages related to right to information act implementation.

Enhancements to RRCAT Intranet

The features which have been added to RRCAT Intranet include authenticated module for display of Service book data for verification by individuals and module for searching information for ex Employees of RRCAT. A Link related to CHSS Circulars and CHSS Scheme has also been added to Intranet. Also Information related to RRCAT Newsletter can be accessed through Intranet. Authenticated access to Dynamic Organization Chart has also been provided. Publication details related to Journal articles, conference papers, seminars etc. can be viewed on Intranet from the information maintained in Publication Archive software. Mail All messages can also be viewed from Intranet.

DAE HR-MIS Software package vivarnika

DAE ANUNET Management Committee recommended creation of common HR database for all constituent units of DAE including PSUs and Aided Institutions. The task of design, development and implementation of common Human Resource Management Information System (HR-MIS) was entrusted to Computer Centre, RRCAT. The first version of Vivarnika is released on ANUNET and can be accessed at http://172.24.5.51:8080.

The server containing common HR database is physically located at RRCAT. At present the centralized database has data of 14 DAE units AEES, AMDHQ, BARC, DAEHQ, ECIL, HCRI, HWBHQ, IGCAR, IPR, NFC, RRCAT,SINP, TIFR and VECC.

DAE HR-MIS Software package 'Vivarnika' is a web based software, which can be accessed on ANUNET to view information about all DAE employees. The purpose of this software package is to provide a consolidated view of data contained in multiple HR Information Systems located at various DAE units through a centralized database for browse/ view/ query/ report/ analysis purpose.

The consolidated data will serve the requirements for Manpower profiling/ planning, obtaining personal information, project planning, manpower deployment to identify the expertise available in any particular area for composition of committees, compiling manpower related statistics for answering parliament questions etc.

Expansion of the Telecommunication network

Telecommunication facilities were extended to 30 more locations in the laboratory and colony area. Twenty number of analog connections were replaced by digital connections.

In continuation of the ongoing work, 66 major distribution boxes have been replaced with fresh krone modules. This will help in increasing the reliability of the telecommunication services in the colony and laboratory areas.

Contributed by:
Anil Rawat; rawat@cat.ernet.in

C & S division

Various projects taken up by C&S Division are as follows:

Training School Building and **Training School Hostel:** The work is completed and the building is handed over.

RF & Microwave Lab: Construction work of building for RF & Microwave technology is nearing completion. False ceiling and painting works are in progress along with internal electrification and power distribution. Estimated electrical power load of the building is 2.30MVA.

Laser and Target lab: Work of Building for housing various groups of Laser activities is in progress. RCC framed structure, brick work and plastering work is completed. Finishing work is in progress. Plinth area of the building is 4100sqm. Total electrical power requirements have been estimated to 600kVA. Works pertaining to wiring, power distribution are in progress.

Training school building

Construction of LCW plant extension, Alignment lab, Power conditioning system lab, Cryogenics & MOVPE lab, 18 nos. Type IV-D houses, 48 nos. Efficiency Apartments, Yoga & observatory building, Extension of school building are in full swing.

The work of over head water tank, under ground sump and substation building, has just commenced and are in progress.

Training school building

Electrical works in progress include fire pump house featuring PCC based automated control system and MCC, LV cabling package for various buildings, telephone network expansion. For enhancement of reliability and safety of power system existing 11kV oil ring main units are being replaced by vacuum based ring main units.
Contributed by: C&S Division.

Contributed by:
A.M. Kekre; kekre@cat.ernet.in

केन्द्र में दिनांक 01.04.2005 से 30.06.2006 तक आयोजित हिन्दी की विभिन्न गतिविधियाँ

राजा रामन्ना प्रगत प्रौद्योगिकी केन्द्र, इन्दौर में दिनांक 28.06.2005, 12.09.2005, 27.02.2006 तथा 26.05.2006 को एक पूर्ण दिवसीय हिन्दी कार्यशाला का आयोजन किया गया, जिनमें क्रमशः 18, 17, 18 तथा 16 अधिकारियों : कर्मचारियों को प्रशिक्षित किया गया और उन्हें भारत सरकार की राजभाषा नीति, प्रशासन, लेखा, लेसर, त्वरक आदि विषयों की पर्याप्त जानकारी दी गई। इस केन्द्र के तीन कर्मचारियों को केन्द्रीय हिन्दी प्रशिक्षण संस्थान, नई दिल्ली द्वारा आयोजित पत्राचार पाठ्यक्रम के माध्यम से प्रशिक्षित कराया गया।

राजभाषा हिन्दी के प्रचार–प्रसार के लिए गठित आरआरकेट की राजभाषा कार्यान्वयन समिति की उक्त अवधि के दौरान कुल 5 बैठकें क्रमशः दिनांक 29.06..2005, 09.09..2005, 09.12..2005, 24.03..2006 तथा 08.06..2006 को आयोजित की गई ।

इन्दौर स्थिति केन्द्र सरकार के कार्यालयों की प्रथम छः माही की 42 वीं बैठक 16.08..2005 तथा द्वितीय छः माही की 43वीं बैठक दिनांक 02.03.2006 को आरआरकेट के निदेशक कार्यालय स्थित सभाकक्ष में आरआरकेट के निदेशक डॉ. विनोद चन्द्र साहनी की अध्यक्षता में सम्पन्न हुई।

संसदीय राजभाषा समिति की साक्ष्य एवं आलेख उप समिति द्वारा इन्दौर स्थित केन्द्र सरकार के 15 कार्यालयों के प्रमुखों के साथ दिनांक 31.12.2005 को विचार–विमर्श किया गया था तथा दिनांक 01.01.2006 को उप समिति को विदाई दी गई। इस संबंध में उनसे सराहना–पत्र भी प्राप्त हुआ है।

सी–डेक पुणे के आईएसएम वी5 (नेटवर्क वर्जन) पैकेज की दिनांक 06.01.2006 को खरीद कर इसकी संस्थापना इस केन्द्र के 100 कम्प्यूटरों में की गई है तथा दिनांक 01.02.2006 से सही रूप से कार्य कर रहा है। उक्त अवधि के दौरान रु. 11,881 की हिन्दी पुस्तकें खरीदी गईं।

आरआरकेट की राभाकास की आरे से इस केन्द्र के मुख्य सभागृह में उपस्थित श्रोताओं को मंत्र–मुग्ध कर दिया। इस समारोह में लगभग 500 कर्मचारियों:अधिकारियों ने भाग लिया।

वर्ष 2005 में आयोजित विभिन्न हिन्दी प्रतियोगिताओं के विजेताओं को पुरस्कृत करने के लिए दिनांक 21.03.2006 को पुरस्कार वितरण समारोह एवं सांस्कृतिक कार्यक्रम का आयोजन किया गया। इस कार्यक्रम में केन्द्र की गृह पत्रिका प्रगति के 18 वें अंक का विमोचन समारोह के मुख्य अतिथि राजभाषा भूषण से सम्मानित माननीय श्री सत्यनारायण व्यास, पूर्व प्रमुख, रासायनिक उपचार सुविधा, आरआरकेट द्वारा किया गया।

जयनारायण सोनी
सहायक निदेशक (राजभाषा),
आरआरकेट