

Neutron Facilities and Their Applications at China Advanced Research Reactor

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The China Advanced Research Reactor (CARR) is a high-flux and multipurpose reactor, located at the campus of China Institute of Atomic Energy (CIAE) in Beijing. This reactor is a tank-in-pool inverse neutron trap type reactor with a maximum power of 60MW. The peak flux in a heavy-water reflector is about 8.0×10^{14} n/cm²/s. The main applications of the CARR are neutron scattering experiments, radioisotopes production, material irradiation, neutron transmutation doping silicon, neutron activation analysis, etc.

Up to date, fifteen neutron instruments have been successfully installed at CARR. They are high resolution powder diffractometer (HRPD), high intensity powder diffractometer (HIPD), residual stress diffractometer (RSD), texture diffractometer (TD), single crystal diffractometer (SCD), thermal neutron triple axis spectrometer (TAS), triple axis spectrometer (IOP-CIAE TAS), neutron reflectometer (NR) and small-angle neutron scattering (SANS), engineering diffractometer (ED), cold neutron triple axis spectrometer (CTAS), multi axis crystal spectrometer (MACS), thermal neutron radiography (TNR), cold neutron radiography (CNR) and neutron depth profiling (NDP). In addition, the neutron activation analysis systems (NAA) are under construction. These neutron instruments are open user facilities. In fact, many research institutes, including China Academy of Sciences, Peking University, Central South University, Renmin University of China and the Juelich Center for Neutron Science of Germany, have involved as collaborators in the construction of the instruments.

By using these instruments, many researches have been carried out. In this talk, some research examples on battery materials, magnetism, structural materials, archaeology samples and industry applications will also be briefly introduced.