

The Spallation Neutron Source

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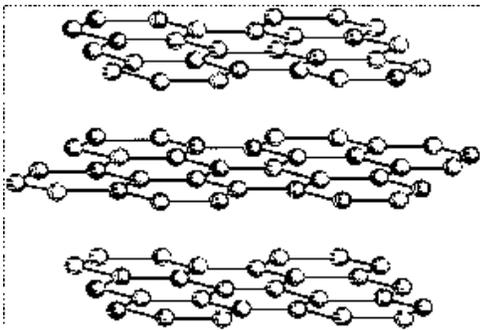
Oak Ridge National Laboratory

Associate Laboratory Director for the SNS

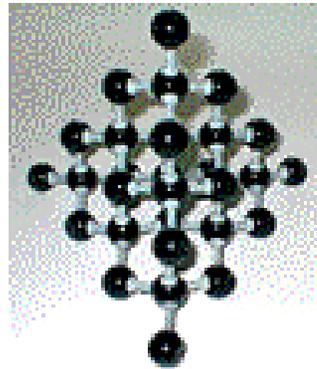
December 13, 2001

Structure determines properties

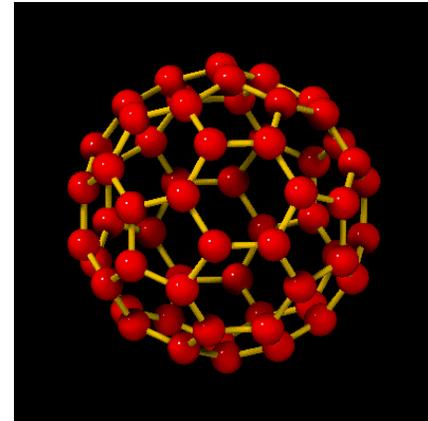
3 forms of Carbon - very different materials



Graphite



Diamond

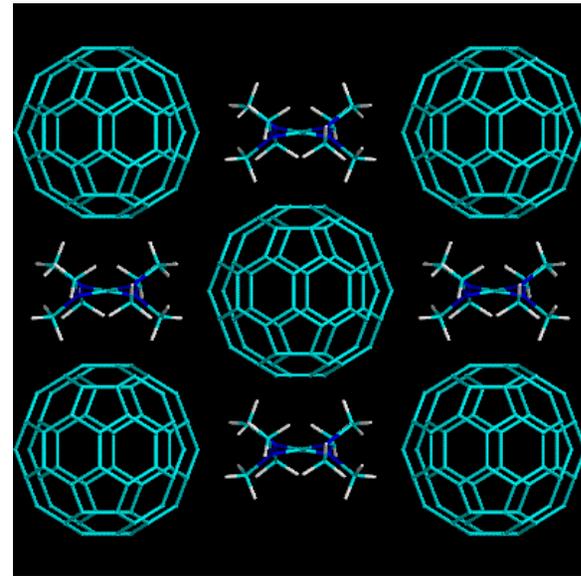
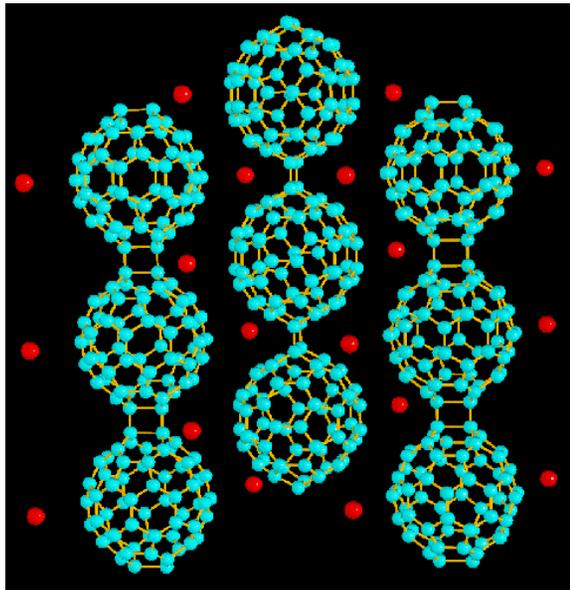


Buckyballs

Knowledge of structure and dynamics leads to new materials



- Superconductors or organic ferromagnets



Scientific justification for SNS

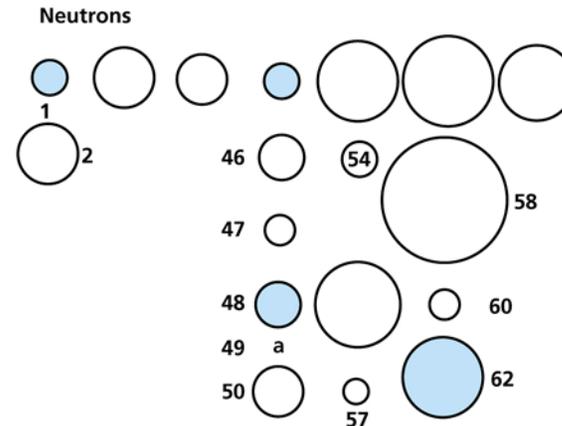
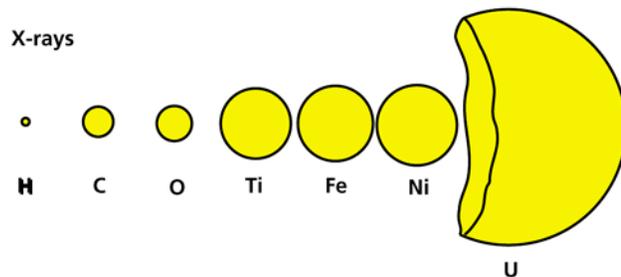


- Neutrons provide unique insight into materials at the atomic level
 - ‘see’ light atoms in biomaterials and polymers
 - study magnetic properties and atomic motion
 - measure stress in engineering components
- Neutron scattering was developed in the U.S., but we now have a serious shortage of facilities and they are not best in the world
 - State-of-the-art neutron source has been an urgent priority for ~15 years
- The SNS will be world leading and help restore U.S. leadership

Neutrons and Neutron Sources



- You can easily work in extreme sample environments H,T,P,...) e.g. ^4He cryostat (Shull & Wollan) and penetrate into dense samples
- The magnetic and nuclear cross-sections are comparable, nuclear cross-sections are similar across the periodic table



- Sensitivity to a wide range of properties, both magnetic and structural

The Spallation Neutron Source



- The SNS will begin operation in 2006
- At 1.4 MW it will be ~8 x ISIS, the world's leading pulsed spallation source
- The peak thermal neutron flux will be ~50-100 x ILL
- SNS will be the world's leading facility for neutron scattering
- It will be a short drive from HFIR, a reactor source with a flux comparable to the ILL