Structure and properties of functional oxides

Experimental

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Introduction

Many of today's technologically important materials are oxides. For example mobile telephones use high-dielectric oxide materials in radio frequency resonators. Computer hard drives use layered oxide materials as read/write heads, while high temperature superconductors find use in high-field magnets. Other oxides are piezoelectric materials used in actuators and transducers and ionic conductors used in fuel cells. This project involves synthesising and characterising new oxide materials.

Description

Students will systematically study a family of oxide compounds, exploring how their synthesis and physical properties varies with composition. Typical experimental techniques used may include X-ray, neutron and electron diffraction, scanning electron microscopy, and physical properties measurements. These measurements may be performed at ANU, or at national and international facilities, depending on the demands of the project.

By the end of the project, students will have established a range of skills in materials synthesis and characterisation, and developed their understanding of the research process and communication of results.

Projects can be offered at all levels from first year undergraduate to Ph.D.

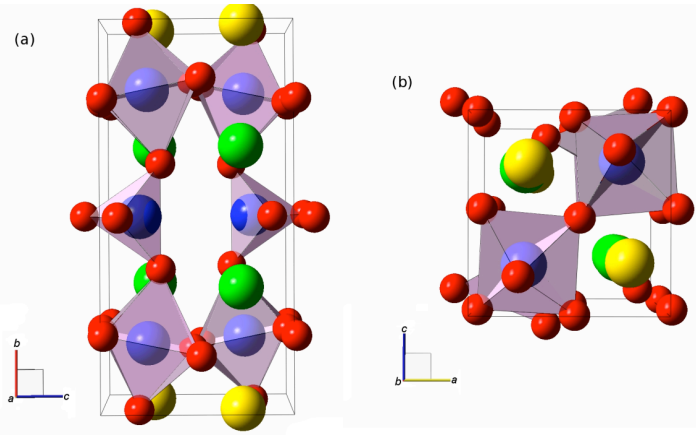

Figure 1: The crystal structure of $LaCa_2Fe_3O_8$, determined by Hours student Jessica Hudspeth using a combination of X-ray and neutron diffraction, performed at ANU and at the OPAL reactor at the Australian Nuclear Science and Technology Organisation. [J.M.Hudspeth, D.J.Goossens, A.J.Studer, R.L.Withers and L.Norén, 'The crystal and magnetic structures of $LaCa_2Fe_3O_8$ and $NdCa_2Fe_3O_8$', *J. Phys.: Condens. Matt.*, **21** (2009) 124206.]