THE UNIVERSITY OF SYDNEY

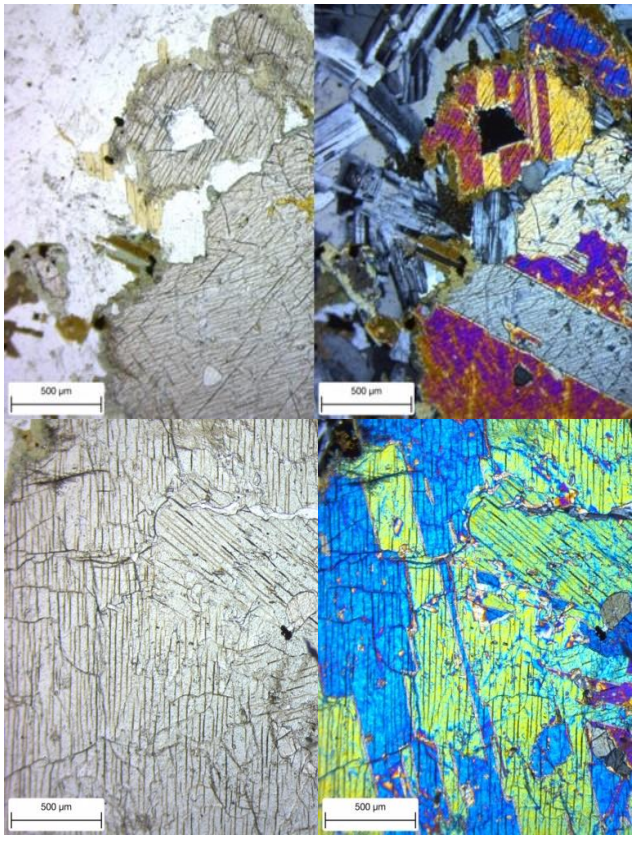
Sydney Analytical
Core Research Facilities

Cutting and Polishing (CAP) Facility

Supporting a wide range of research activity.

The Cutting and Polishing (CAP) facility at Sydney Analytical, provides sample preparation for experimental micro-analysis. We focus on the preparation of high precision cutting and mirror polished thin section from bulk samples, with the ability to adapt every step in the preparation process to suit individual and specific requirements.

The CAP facility can prepare any quantity of single- or double-sided polished thin sections of desired thickness with high precision to 30 µm. We work with coarse- or fine-grained materials, solid and porous, hard or brittle. The facility is equipped with a variety of saws that enables cutting large specimens of ~50 cm in diameter to sizes of <1 cm in diameter. Smaller volumes of material are coated in resin to ensure the sample is preserved. Cutting and handling of water-sensitive materials can be delivered upon request. Sample impregnation or staining are possible for larger and smaller specimens.



Mineralogical thin section prepared for optical microscopy, as seen in transmitted (left) and cross-polarized light (right).

Materials that can be processed include:

- geological samples
- metallic, metallurgical and metallic ore samples
- drill cores
- rare mineral specimens
- concrete
- cements
- ceramics (porcelain, terracotta)
- coral and shell
- bones and teeth
- glass
- resin
- archaeological specimens, etc.

Bulk sample cut into billets → Initial polishing and gluing on glass slide → Grinding and Polishing → Uniform thickness and mirror-like quality

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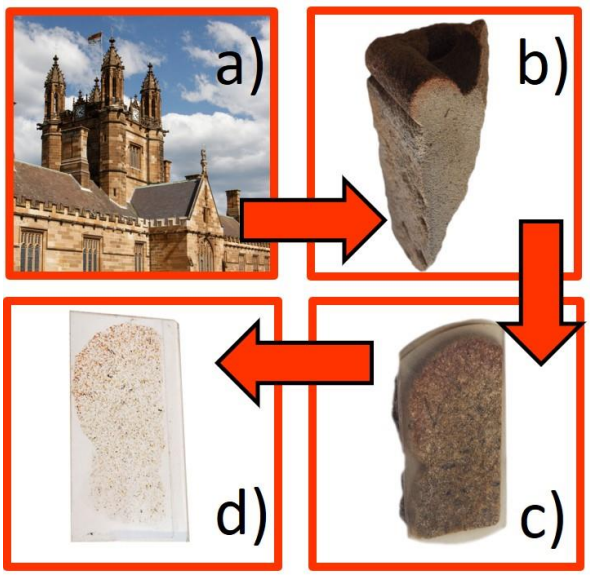
Cutting and Polishing (CAP) at Sydney Analytical

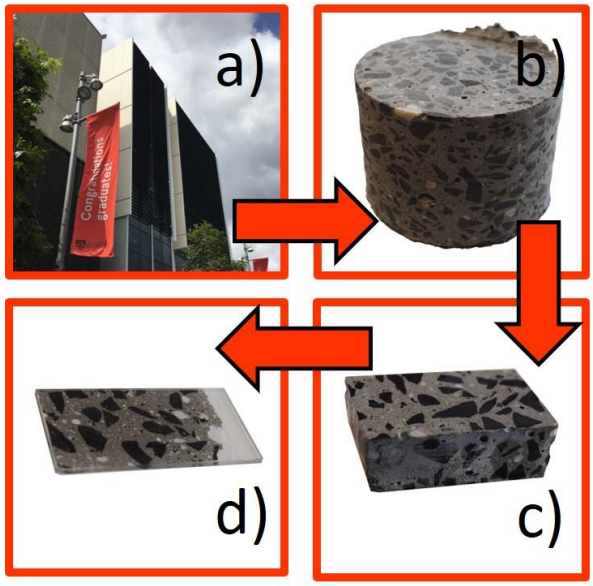
To achieve high quality product output, sample processing at the CAP facility relies on automated and manual labour stages.

Typical thin section preparation starts with a coarse cutting of a billet section from the raw specimen. Pre-polishing ensures intimate contact between glass slide and sample billet for superior adhesion. The next step removes bulk of the billet, leaving only a thin slice of sample glued on the glass slide surface. Coarse to fine grinding follows before the thin section can be finely polished to a mirror-like quality and required thickness. Once the desired thickness has been reached, the final high quality polish is achieved step-wise with progression from coarse to fine abrasive, finalising the polish with <1 µm diamond suspension.

Special care is given to samples which exhibit pressure-induced cleaving or twinning, as well as heterogenous samples comprised of material with different hardness. Targeted cutting of specific sample areas (e.g. changes in the contact surfaces, interlays etc.) can easily be achieved. We offer sample impregnation using colourless or dyed resins as well as sample staining. We value user input throughout the preparation stages, to ensure the best quality preparation for sensitive samples.



Sandstone sample collected from the main quadrangle of The University of Sydney, made from the corner of a block replaced during a recent renovation. The thin section clearly shows the pink alteration boundary caused by Fe-oxidation due to weathering .



Terrazzo concrete sample, as used for flooring in the new School of Life and Environmental Sciences building. The heterogenous nature of this concrete composite is reflected in potential challenges of polishing all components evenly without causing microcracking or loss of grains. The thin section of the sample shown here is 100 µm thick.

Who we are – Sydney Analytical

Sydney Analytical is the University's core research facility dedicated to materials, chemical and biological analysis. We offer open access to the University's flagship capabilities for vibrational spectroscopy, X-ray analysis and magnetic resonance, along with expert technical guidance, to support researchers as they address their most challenging research priorities.

Sydney Analytical supports local and international collaborative research. Our network partnerships includes members such as Sydney Nano, the Brain and Mind Centre, the Charles Perkins Centre, the Australian Nuclear Science and Technology Organisation, as well as extensive industry collaborators, which represents a significant knowledge base through which to drive academic excellence and high-impact research outcomes.

For more information

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