

Center for Molecular and Materials Sciences

CMMS

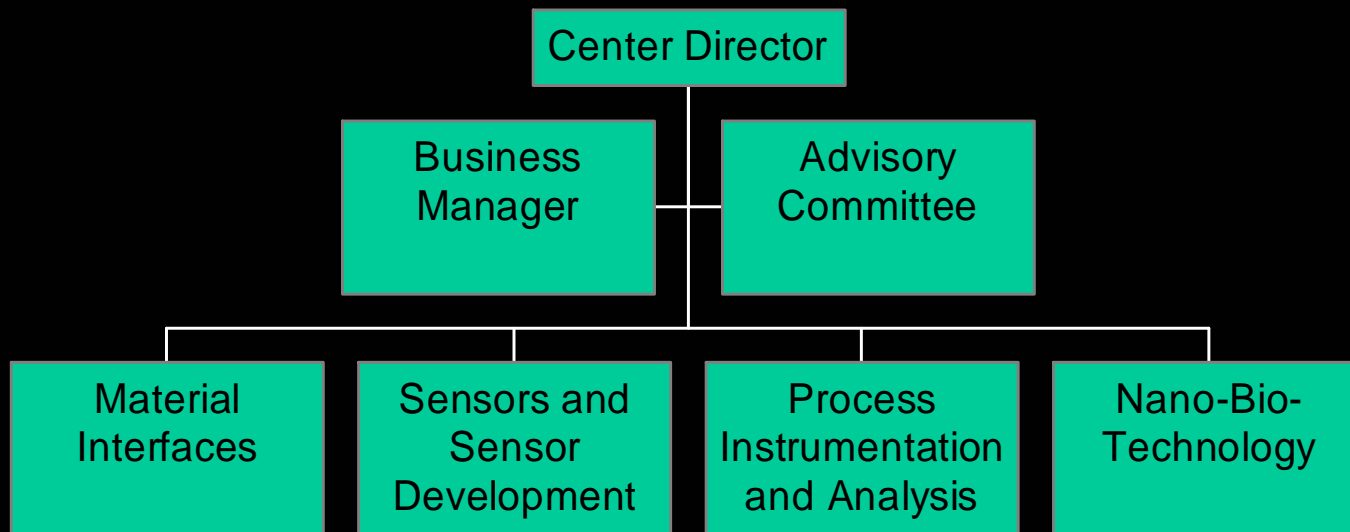


**School of Pharmaceutical,
Molecular and Biomedical Sciences**
University of South Australia

November 18, 2003

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Structure



CMMS *Objectives*



- Investigate, analyze, and model fundamental molecular processes occurring at gas-material or liquid-material interfaces
- Apply fundamental, molecular principles to analyze, interpret and improve industrially relevant materials research opportunities

CMMS *Priority Research Areas*



- **GAS-MATERIAL INTERFACES**
 - Fundamental investigations into low-, high-, and supercritical gas adsorption by porous materials
 - Synthesis, characterization, and application of nanoporous (mesoporous) inorganic oxides as adsorption mass-separation agents and as sensors
 - Porous materials' surface modification for adsorption process interpretation and development

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Priority Research Areas

- **SOLUTION-MATERIAL INTERFACES**

- Dilute solution adsorption-purification process analysis and development
- Solution adsorption kinetics modeling
- Preparation of controlled nanoporous materials for solute solubility enhancement, solute structure control, and as controlled-release agents
- Ion-channel model systems
- Neutron-scattering methods to determine the location and physical structure of the adsorbed phase within nanoporous networks

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Priority Research Areas

- **NANO-BIO-TECNOLOGY**
 - Growth of inorganic oxide particles within surface-chemistry-modified activated carbon systems
 - Inorganic oxide arrays for biomolecular sensing and sensor development
 - Super-critical-fluid extraction and purification of natural and synthesized mixtures
 - Use of super-critical-fluid processing to synthesize nanoporous materials

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Priority Research Areas

- **SENSORS AND SENSOR DEVELOPMENT**
 - Flow injection analysis applications
 - Sensor development for opaque and complex systems
 - Gas and solution micro-sized sensors for solute separation, purification, and detection
 - Fundamental analysis of metal speciation – ultra-low level detection in drinking water purification processes

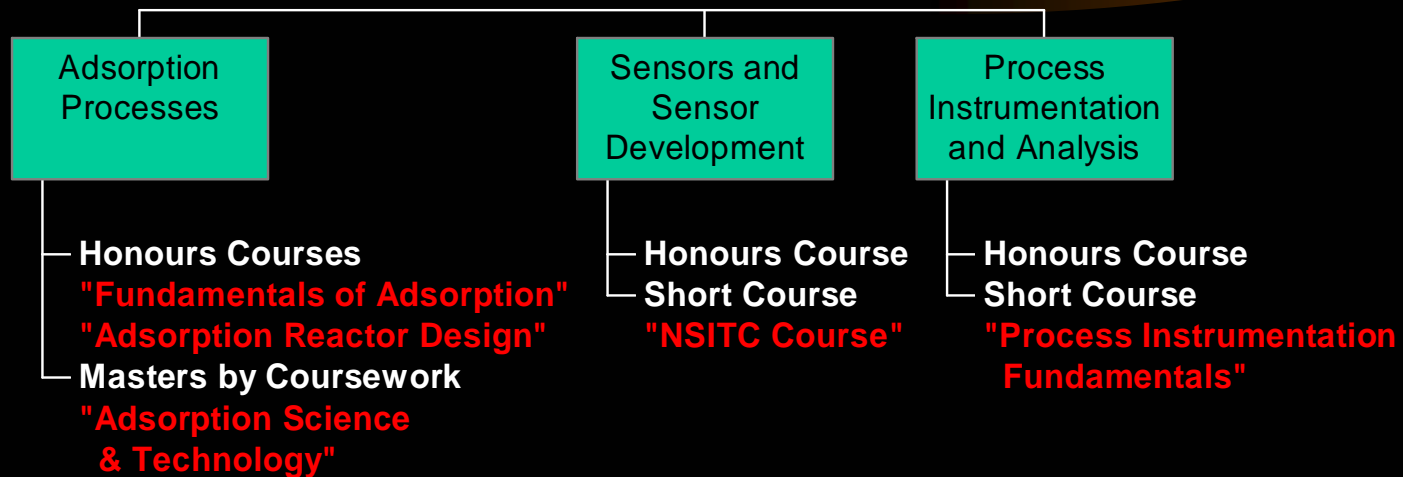
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Priority Research Areas

- **PROCESS INSTRUMENTATION AND ANALYSIS**
 - Extraction method development for chromatographic preparations and analyses
 - Disinfectant level monitoring in water distribution systems
 - Research instrument development and control
 - Uncertainty analysis of data, measurements, and in experimental and process design
 - Fundamental adsorption engineering research

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Teaching and Education Programs



CMMS *Major Sponsors*



- **NCG Awards**
 - ARC Linkage
 - DISR - International Collaborations Development
 - DFAT - Australia-Asia (Korea)
 - GWRDC
- **Industrial Sponsors**
 - Alcoa World Alumina
 - PICA (France and Australia)
 - Norit
 - Rio Tinto
 - SA Water