



## Advanced Surface Technology Research Laboratory

**T**he Advanced Surface Technology Research Laboratory (ASTRaL) is a research unit of Lappeenranta University of Technology based in Mikkeli in the Etelä-Savo region. It carries out top-level research in materials technology and aims to link the research expertise of the University with the high technology industries which are located in the region, Finland in general and internationally.

ASTRaL specializes in surface technology focussing on thin film deposition, surface modification and material characterization. The expertise of ASTRaL in basic and applied research advances the development of the leading edge materials technologies that are essential in producing innovative solutions to materials problems. Our collaboration with industry enables this knowledge to be used to develop new higher value products and lower cost production solutions.

ASTRaL educates the highly skilled scientists and engineers at doctoral and master's levels who can answer the technological challenges of the future.

ASTRaL is a partner in the Mikkeli University Consortium, a networked academic community which comprises the Mikkeli based units of four Finnish universities: University of Helsinki, Helsinki School of Economics, Lappeenranta University of Technology and University of Kuopio. MUC provides scientific research and university-level teaching and interaction with surrounding society.

### Research in ASTRaL

#### Surface Engineering

ASTRaL's research is concentrated on surface engineering of materials to achieve novel or improved properties. This is done by manipulating the properties of a thin layer at the surface by



subjecting it to an active environment or by depositing other materials on it. The applications of this modification are, for example

- wear resistant coatings
- biocompatible coatings
- protective coatings
- decorative coatings
- catalytic coatings

#### Thin Film deposition

Thin layers of metal, ceramic, polymeric layers or combinations of these are used to enhance material properties using two main deposition processes:

- **Atomic Layer Deposition (ALD)** - thin films of material are built up in sequential layers one atom thick. This gives extreme control over the uniformity and conformality of the material

and allows the deposition of layers with controlled structure such as nanolaminates.

- **Magnetron Sputtering** - a 'target' material is bombarded by high energy ions. Material is ejected from the target and deposited on the part to be coated. Mixed materials, graded layers and multilayers can also be deposited.

#### Staff

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