

ASTRaL

Advanced Surface Technology Research Laboratory



The **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 links 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 and surface modification. The basic and applied research carried out in ASTRaL develops the leading edge materials technologies that are essential for finding innovative solutions to the growing materials problems of our

world. Our collaboration with industry enables this knowledge to be applied to the development of higher value products and lower cost production solutions while at the same time reducing their environmental impact. ASTRaL educates to doctoral and master's levels the highly skilled scientists and engineers who can answer the technological challenges of the future. ASTRaL is a partner in the Mikkeli University Consortium, a networked academic community comprising the Mikkeli based units of a number of Finnish universities. It provides university - level scientific research and teaching and promotes interaction with the surrounding society.

Research in ASTRaL

ASTRaL's research is concentrated on surface engineering of materials at the nanometre scale to achieve novel or enhanced properties by depositing thin layers on the surface. The applications are, for example, in

- diffusion barrier layers for improved lifetime of perishable goods and plastic electronics
- photocatalytic coatings for self-cleaning surfaces and pollution reduction
- protective coatings to prevent corrosion
- optoelectronic materials for new high performance devices
- scaling up processes from the laboratory level to more practical dimensions.



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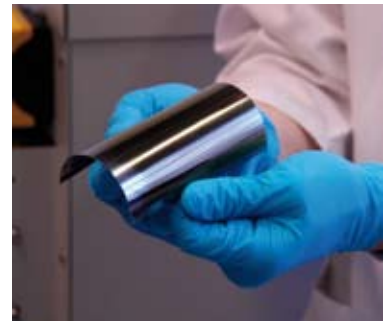
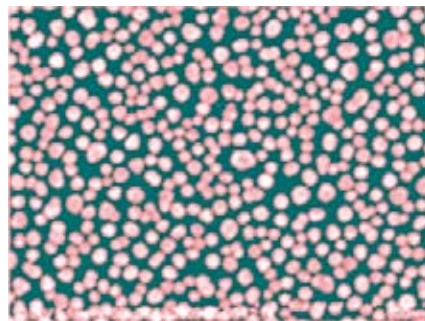
Thin Film deposition

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. ASTRaL is developing a roll-to-roll ALD process for polymer and fibre-based webs which will make the process available for many new industrial applications.
- **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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