

## Nanotechnology at the University of Iceland

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Currently, the University of Iceland is in the process of setting up a nanofabrication facility. The facility consists of a nanotechnology cluster, which contains equipment for fabricating structures with dimensions in the range 1-10000 nm from a range of materials, as well as nanoscale characterization equipment. This effort is part of a national nanotechnology initiative which involves universities and research institutes, in line with the 2005-2009 National Science and Technology Council framework program, where nanotechnology is one of two focus areas.

The framework program states that nanotechnology refers to science and technology on the nanoscale, extending across the conventional boundaries of disciplines like physics, chemistry and biotechnology. Accordingly, the representatives of the nanotechnology initiative have endeavored to construct a facility that can serve a variety of research fields. Although work has just started on the nanotechnology cluster, it already supports research projects within biology, chemistry, physics and engineering that involve design and fabrication of nanometer-sized structures.

Nanoscale processing requires an environment with a low number of airborne particles – even a single piece of dust can interfere with the fabrication process. The nanoscale cluster will include a cleanroom facility where the number of dust particles will be a thousand times lower than in a typical work environment. The main source of particles in a cleanroom is its staff and special protective clothing must be worn to minimize contamination of the cleanroom. The fabrication technology builds on principles developed by the microelectronics industry but can be used for a much wider range of tasks. The cluster includes equipment for growing, coating, and etching materials, with an accuracy down to a few nanometers, in addition to photolithography (500 nm resolution) and electron-beam lithography (20 nm resolution). Examples of structures that can be fabricated include nanoscale modulated surfaces, electrical nanocircuits, modulated electron gases, integrated optical circuits, subwavelength structures for interacting with light, microfluidic circuits for biotechnology or chemical lab-on-a-chip systems, micromechanical sensors, etc.

The lecture will outline the purpose of the nanotechnology cluster, describe typical cleanroom processes, and discuss current and future research as well as industrial collaboration projects associated with the nanotechnology cluster.