

## OBTAINING OF GALLIUM NITRIDE THIN FILMS

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We are developing an advanced sputtering technique for the disposition of nitride semiconductors, and specifically epitaxial high-quality gallium nitride (GaN) for its special role in optoelectronics and photovoltaics. We are developing a modified version of high power impulse magnetron sputtering (HiPIMS) technology suitable of high-quality nitrides. Magnetron sputtering has become the process of choice for the deposition of a wide range of important coatings. Examples include hard, wear-resistant coatings, low friction coatings, corrosion resistant coatings, decorative coatings, and coatings with special optical or electrical properties. Although the basic sputtering process has been known and used for many years, the development of the unbalanced magnetron and recently HiPIMS technology opened new possibilities for control of the film microstructure. From a materials point of view, nitride films are widely used in many high tech applications. The project relates therefore to several categories of interest, including photovoltaics, technologies for new materials, and technologies for product processing.

The project executed by a joint team of the Nazarbayev University, Kazakhstan, Lawrence Berkeley National Laboratory, Berkeley, California. The project will start by developing the HiPIMS technology for GaN in an existing and upgraded vacuum chamber at partner laboratory (LBNL). This includes the design and modification of magnetrons for sputtering from liquid gallium target. In a parallel effort, components for a second deposition system will be purchased and a custom system will be developed for deployment at Astana. The deposition process will be developed using a range of plasma diagnostics and materials characterization techniques. After having determined the full functionality of the process and the basic operational parameters for GaN deposition, the NU system will be setup at NU to serve as a state-of-the-art educational and research tool of nitride research.

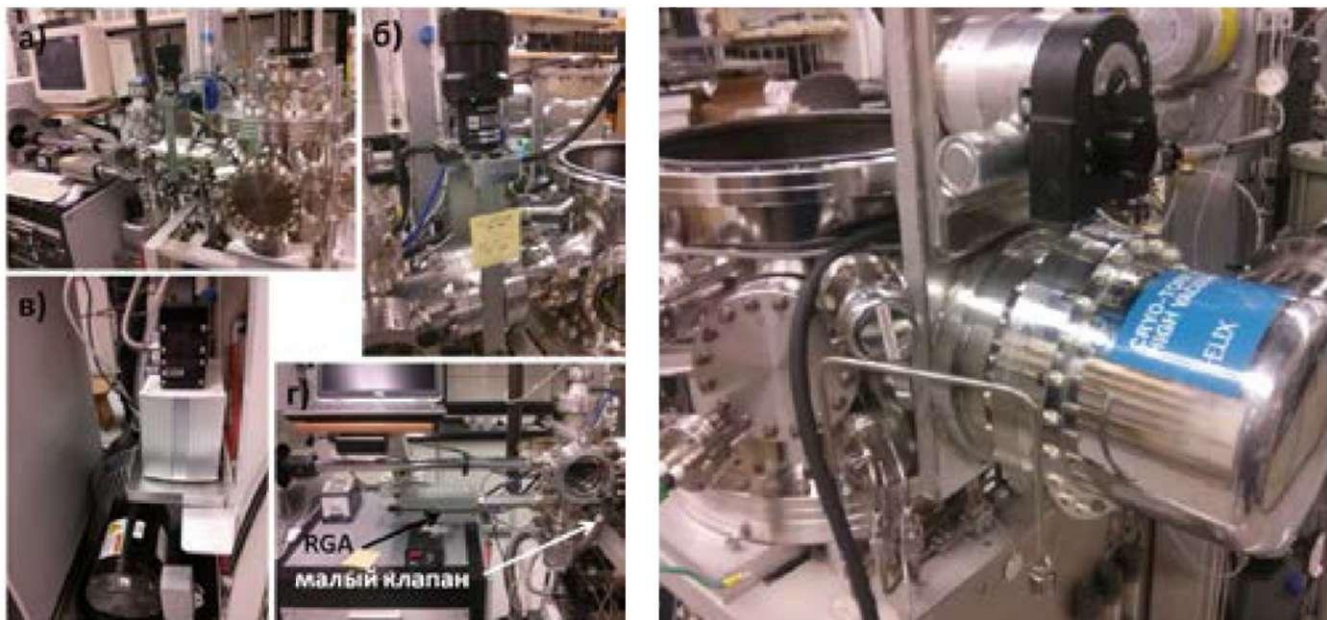


Figure 1. Experimental setup.