



# Turkey Setting Sail to Become a World Player in the Chip Industry

AB-MikroNano, established by the Aselsan and Bilkent University Partnership, will produce GaN based chips (Gallium Nitrate (GaN) semiconductor material-based nano-transistor technology) which is of significant strategic importance for the defence, space, communication and energy sectors. With these GaN based chips, produced at this facility, Turkey will be one of the 5 nations in the world that can produce this specific technology that will transform air defence radar systems, electric cars, high speed trains, and 4G/5G mobile phone systems.

National Defence Minister, Mr. İsmet Yılmaz, Undersecretary for Defence Industries, Prof. İsmail Demir, Bilkent University Rector, Prof. Abdullah Atalar, TÜBİTAK President, Prof. Yücel Altunbaşak, Aselsan, The Chairman of the board of directors Dr. Hasan Canpolat which will be located at the Bilkent University Campus.

Mr. İsmet Yılmaz, National Defence Minister, gave a speech at the ceremony stating that he was pleased to be at the ceremony and used the expression "We are cutting down one other string holding the arms of Turkey. In comparison to yesterday, Turkey will be one more step forward in freedom, one more step forward in power, and one more step forward in self-esteem. Mr. Yılmaz saying "You cannot purchase gallium nitrate based chip technology even if you had the funds, no matter how much value it has" emphasized that Turkish exports tripled, increasing from 36 billion dollars in 2002 to over 150 billion dollars in 2012. Mr. Yılmaz pointed out that they have an export target of 500 billion dollars in 2023, stating "Can we succeed in this? We can achieve it, but how? We certainly must produce products with high value added." Yılmaz drew attention to the example that in the case of Atak helicopter exports they would be sold for 5 thousand dollars per kilogram and in the case of a satellite export, such as Göktürk-2, the export sales price would be 200 thousand dollars per kilogram. He said "However with the products to be produced at this factory as well as the gallium nitrate based chips it will be 10 million dollars per kilo. By how much will it multiply? 50 times more than the satellite. If Turkey produces such products with high value added there is no doubt that we will catch the 2023 targets as well ". Yılmaz, explaining that the export figures of the 10 biggest economies in the world, whereas those of the smallest is 500 billion, said that Turkey will be amongst the top 10 economies in the world when



it reaches this figure in 2023.

Arguing that the sine qua non condition of full independence rests on self sufficiency in the defence industry, National Defence Minister Mr. İsmet Yılmaz, indicated "Today, hopefully these gallium nitrate based chips will not only be used in the defence industry but also in civil sectors. They will be used in much more important fields. As distances grow longer, energy loss increases; but as gallium nitrate products shall be used, the energy loss will also decrease."

*Prof. Demir: "Big companies must give priority to field depth"*

Undersecretary for Defence Industries, Prof. İsmail Demir, pointing out that the activity started as R&D, and it became evident that there was a possibility to transform the technology from the laboratory level to the industrial level by means of a joint effort between a company and a university, said that "If we are looking for a model for Turkey, this is one of the most basic models we will encourage and as the under secretariat we will encourage and provide incentive for

such models in the coming periods." In addition, Prof. Demir pointed out that large companies should focus deeper in



Prof. İsmail Demir, Undersecretary for Defence Industries (SSM)



specific areas instead of just focusing on horizontal growth and this would lead to creating technology wonders in Turkey. Prof. Demir called upon all companies, academics, universities and research and development companies to examine their road maps, saying, "As SSM we will be supporting such activities with our resources. Because such products are those that you will not be able to purchase in time, have difficulty in supplying them even if you would like to when necessary. In the long run the university will perform the research and development of another material that may come up and such type of companies will realize them. Turkey must certainly set to be in this trend as a target for itself."

Aselsan, The Chairman of the Board of Directors, Dr. Hasan Canpolat, underlined that the technologies achieved will find usage fields in many sectors said, "The first product of this partnership, which is GaN transistors, will be produced within two years and take their position in upper systems of Aselsan like multi-purpose phase lined radars, fire control radars and electronic war. The radar Aselsan is planning to realize at Gölbaşı with an investment value of 200 million dollars, Radar, Electronic War and Intelligence Perfection Center will then be an important source for this facility."

Bilkent University Rector Prof. Abdullah Atalar reminded us that communities producing information are on the lead in the global race and stated "We missed the silicon train but we are on the gallium nitrate train." He emphasized that the R&D support to the universities in the last 10 years increased by 10 times.



Özbay: "The facility is aimed to serve in 18 months"

Prof. Ekmel Ozbay, President of the Bilkent University Nanotechnology Research Center (NANOTAM) and General Manager of AB-MikroNano company, informed that a factory to produce gallium nitrate based chips was developed as a result of R&D to be sold as trade goods. Özbay reminding that they did not produce the first chip in Turkey said that chips were produced in TÜBİTAK and ODTÜ MEMS Center previously, however these stayed at the R&D level only.

Özbay, emphasizing that Aselsan and NANOTAM, executing mutual projects, said that they also developed the first chip by a mutually run project on gallium nitrate materials. Özbay, pointing out that the chips are made of a new material called gallium nitrate, explained that this material works efficiently at high temperatures and in space. Stating that this year's Nobel science prize was given to Japanese scientists discovering this material, Özbay said, "We think that we will be a producer in this 10-15 billion dollar market from now on."

Attracting attention to the fact that gallium nitrate is used in radars in the defence industry, and is a material to be used in sun and wind energy, electric car, speed train and cellular phone frequencies, Özbay said "We will produce hundred thousands of chips in these facilities. The building will be completed at the end of the year. We will start the production facilities at the 18th month and after 2 years; our first trade chips will be delivered."

### **AB-MikroNano Company will Produce Chip and Integrated Circuits**

The 30 billion dollar university-industry cooperative company will be a sample for Turkey. The company was named AB-MikroNano after the A of Aselsan and the B of Bilkent University.

With this technology achieved, the production of nano-transistors with high power and speed used especially in defence fields, will be possible. This technology is known to be the most critical new technology, and that is in the hands of only a number of countries in the world, in the field of radars, currently. With the achievement of this ability to produce this new technology, the elimination of Turkey's outside dependency on technology is possible,



the aim of "technologic efficiency" is within reach.

GaN based chips, the first products of the partnership, will be produced in two years time taking their place in the high level systems of Aselsan like multipurpose phase lined radar, control radar, fire control radar, electronic war. Gallium Nitrate (GaN) is stepping forward in the world in recent years because of its high physical specifications.

Previously, Gallium Nitrate (GaN) semi-conductive material based chip technology, supported by TÜBİTAK and Defence Industry Undersecretariat (SSM), was developed nationally by Aselsan and Bilkent and GaN based high performance chips were produced at Bilkent University Nanotechnology Research Center (NANOTAM). It was seen that these products could work at high speeds and at high power; the chips, whose lab tests were completed, were used successfully in field tests performed at Aselsan. As a consequence of the above target performance results reached, Aselsan and Bilkent management decided to invest in producing chips and integrated circuits in Turkey, establishing a joint company.

AB-MikroNano, will realize the production of chips and integrated electronic circuits with trading purposes for the first time in Turkey. The nanotechnology products produced by the company will also be exported outside the country.

### **High Speed Train, Electric Cars, 4G and for Renewable Energy**

High performance chips produced completely and originally using national resources, can be used in radar applications as well as in many different areas like High Speed Trains (YHT), renewable energy, electric cars and 4G mobile phone systems. Turkey is in a position where it is amongst a few countries in the world that can develop Gallium Nitrate (GaN) semi-conductive material based chip technology.