Teamwork is Key

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Prof. Krzysztof Jan Kurzydłowski, director of the National Center for Research and Development (NCBiR), talks to Karolina Duszczyk.

* In the context of international research, how is Poland doing in areas such as nanotechnology?

Poland is well positioned in the area of new materials, advanced materials, nanotechnology and nanomaterials, as evidenced by the prominent role it plays in the overall body of global publications in this field. In this particular area, we are far above the average position we occupy in terms of overall scientific research. Among the five leading countries are Britain, France and Germany as well as-depending on the field-Spain, the Netherlands and Italy, but in the case of nanotechnology we rank among the top five countries. * Would you agree that the success of a research project should be measured by the degree to which it has been applied in practice rather than just publications or patents? The successes of our scientists and companies working with them testify to our high position. I'm not only talking about competitions organized by the European Commission, but also about our considerable role in international consortiums in the field of materials engineering.

The quality of Polish research work is so high that we are a welcome partner in projects in our region that involve companies and scientists from countries such as Germany, Slovenia, Finland, and the Czech Republic. It is worth mentioning that agencies financing research in countries including Taiwan, Singapore and Israel are seeking to establish cooperation with the NCBiR. Institutions from these countries, which lead the way in innovation, are seeking to establish joint ventures with partners in Poland in the field of materials.

Practical application is of course an important measure of research success, but it is necessary to remember that it often takes five to 10 years to reach this stage. Before industry decides to apply new materials on a large scale, it must test them for several years to check if a component made from a given material retains its original properties in the long term. It's nobody's fault that the implementation process takes time. We should accept that for a fact, be patient and learn to appreciate whatever interesting and important opportunities a given research project creates before it can be successfully applied in industry.

* Does this also apply to the ongoing work on graphene in Poland?

Graphene is a very interesting new material. Scientists took an interest in it recently, and technology experts followed suit with a slight delay. But it will take at least four years before we can think of using graphene in industry. Unless we take advantage of this period to further develop research in this area, the actual day when we begin to produce products using graphene in Poland will be delayed. Thanks to the achievements of teams linked with the Institute of Electronic Materials Technology, for example, graphene is an area where Polish

science ranks very high. Anyone who's dealing with this issue in Europe knows that this will have to be done by opening the way to cooperation with Polish scientists.

* Any other examples of flagship Polish projects in materials engineering?

There are a few other areas that may not be as spectacular for the public today-areas that are not supported by incentives such as the Nobel Prize- but are nonetheless worth keeping in mind. One of them is undoubtedly gallium nitride produced by the Amono company. This material is of fundamental importance to the future development of consumer electronics, and the form obtained by the Amono company is a model to follow across the world. The Polish product is beyond reach for other laboratories. Gallium nitride will be used in new-generation equipment for displaying images. Thanks to it, a device the size of a telephone will make it possible to project on the wall an image that we now have in plasma or LCD televisions. Thanks to the projectors, there will be no need to produce huge panels for displaying the image.

Other examples are nanometals produced at the Warsaw University of Technology by a team led by Prof. Małgorzata Lewandowska. Nanometals have a very wide range of applications including aviation and medicine. We have also had some very interesting achievements in Poland in the field of biomedical materials-these can be used in various types of implants, including those used in tissue engineering.

* The recent FUMAT 2011 conference provided an opportunity to discuss these achievements. What were other significant outcomes of that meeting?

This was an important event in the context of the ongoing efforts to develop a science policy for Poland. Together with scientists and industry professionals who submit applications to the NCBiR, we could see that there is no single recipe for excellence at an institution financing scientific research. In both Poland and across Europe, we face the same challenges: how to simplify the procedures, how to reduce red tape. I was further motivated to look for our own solutions while keeping in mind what is happening in the European Commission.

We also talked about synchronizing research conducted in Poland with that of our potential partners in Germany, Finland and other European countries. Although we should have our own experience and research achievements in all areas important to a modern state, in strategic areas we should team up with partners from abroad. This makes it possible to mobilize a sufficiently large team of people and effectively spend funds on research. Certain things simply cannot be done on a small scale. Europe discovered that when it experienced the painful problems associated with the development of civil aviation. Only after the Germans, French and British joined forces, and were later aided by the Italians and Spaniards, did opportunities emerge for a product like Airbus. No European state was singlehandedly capable of producing civilian aircraft competitive with regard to those produced in the U. S. The same is true of many other areas, so it makes no sense for us to go it alone-using nothing but our own skills and resources-and spend tens of millions on projects that require hundreds of scientists, engineers and hundreds of millions of euros in order to be carried out. This also applies to graphene, which is set to become the subject of coordinated European research.

This of course does not exclude pursuing independent research in Poland so that we don't fall behind and have our own achievements. But if it comes to putting research results to a commercial use, let's face it, this will require much greater outlays than Poland is capable of incurring on its own.

Extraordinary Potential Polish scientists have made a considerable contribution to trail-blazing research on graphene that won two Russian-born professors working at the University of Manchester in England the Nobel Prize in Physics last year. Graphene is a material that could have myriad hi-tech applications and may even replace silicon in electronic devices in the future. The two Nobel Prize-winning physicists, Andre Geim and Konstantin Novoselov, first produced it by decidedly low-tech means. They shared the prize for their work producing and characterizing the material. Polish researcher Włodzimierz Strupiński, Ph. D., worked with Geim as the latter was studying the extraordinary properties of graphene together with Novoselov. A procedure to patent a method for the industrial production of graphene is under way in Poland. Transparent, flexible and durable, graphene would be a perfect material for use in electronics. It could be used to make electrodes in LCD and touchscreens, transistors, microchips and many other components. The Warsaw-based Institute of Electronic Materials Technology (ITME) is working to improve the method for producing graphene.