

Georgi Nadjakov – a Man of Science Physicist with Worldwide Recognition

Kroum Kolentsov

Georgi Nadjakov Institute of Solid State Physics, BAS, 72 Tsarigradsko Shose Blvd., 1784 Sofia, Bulgaria



Abstract. The present work reflects a remarkable activity of Georgi Nadjakov as a discoverer and inventor. It is over in two institutions – in the Sofia University and in the Bulgarian Academy of Sciences. He is author of two discoveries and two inventions. Photoelectret state of mater is the first discovery. It was incorporated in the unique Golden Book of the discoverers and inventories in Bulgaria. Contact potential photovoltaic effect in semiconductors with high resistivity is the second discovery. His inventions are in the field of scientific instrumentation.

Keywords: Georgi Nadjakov

Physics as a fundamental science lies in the foundations of science, technique and industry and contributes to development and prosperity of our society. The remarkable scientific and organization activity of Georgi Nadjakov in the field of experimental, applied and measurement physics is part of the history of physics in the Sofia University and in the Bulgarian Academy of Sciences during the 20 century.

Georgi Nadjakov* (1896 – 1981) is a Bulgarian scientist. He is an author of two discoveries. One of them is officially recognized and has world significance. He is inventor in the field of scientific instrumentation as well [1-4].

As a result of investigations of the conductivity of high-resistance materials and photoelectric phenomena in dielectrics and semiconductors Georgi Nadjakov realized a remarkable discovery in the 30s of the twentieth century. It concerns the photoelectret state of matter. Investigating the photoconductivity of polycrystalline sulfur Georgi Nadjakov, Sofia University professor then, found residual polarization. It persists long time and can be destroyed by light in the region of the proper photo-sensibility of the sulfur without external electric field.

Paul Langevin reported on a session of the French Academy of Sciences in the end of June 1937 about the unusual results achieved during the last two years by the Bulgarian scientist Georgi Nadjakov. The article was published in “*Comptes rendus de l’Academie des Sciences, Paris*”, 204, 1865, 1937. Its title is “*On a new kind of permanent polarization with dielectrics*”. Nadjakov shows in this paper, that a new phenomenon consists in the following: with the simultaneous action of electric field and light permanent polarization emerges in the sample of sulphur, which conserves in dark and destroys by light with depolarization current. Georgi Nadjakov called the permanent polarization “*photoelectric polarization state*”. Dielectric he named “*photoelectret*”. Photoelectrets have two interesting properties: constant electric field, and electrical “*memory*”.

The new phenomenon discovered by Georgi Nadjakov provoked a large interest among the world scientific and technical community and leaded to creation of foreign schools in different countries of the world (USA, Soviet Union, Japan, India, and Brazil). It had an international significance. The discovery of Georgi Nadjakov contributed to creation of a modern copying technics that replaced a heliograph.

The first Bulgarian diploma for scientific discovery has given to Georgi Nadjakov quite later, on 12 March 1981 with the priority of 22 June 1937. His claim has registration number 29479 from 1975. The recognition of the discovery of the photoelectrets from the Patent Office in Bulgaria permits Georgi Nadjakov to be written on the first page of the unique Gold book on discoverers and inventors in Bulgaria, founded in 1981 on the occasion of 1300th anniversary of creation the Bulgarian state [5-6].

The second discovery of Georgi Nadjakov is not registered in the Patent Office of Bulgaria but it is recognized by the physics community at home and abroad. Discovery of the contact-potential photovoltaic effect in high-resistance semiconductors is known as effect of Nadjakov-Andreichin also. The effect was discovered during the period 1941 – 1951.

Besides both discoveries the most valuable are his achievements in the electrometry (technical physics). In this scientific area, he created and elaborated four original electrostatic electrometers with different construction. Originally, these devices are used in various fields of measurement physics and technics because they have a large input impedance, low power consumption and high sensitivity. Two of them are recognized for inventions during the 60s of the last century. Quadrant-needle system is a novelty in them. It consists of quadrants and needle-filiform systems.

The first invention, called cylindrical quadrant system, has two cylindrical segments, which divide two quadrants by a screw line with different declivity. The needle system has a rectangular frame from thin, hard, gold-plated quartz filaments, central attached to thin, vertically strained Wollaston filament, which permits vertical rotation toward the quadrant system.

The quadrant system of the second invention is circle-like. It consists of a circle-like disk or two opposite circle-like disks at a distance from several millimetres one to another, over which or in the inter-space of which rotates the needle system. This circle-like system allows easier construction. Its characteristics are high sensitivity, increased fade, short period and linear scale. The needle system has two gold-plated quartz filaments with thickness 100 microns. They are fine glued together just under right angle. Short vertical filament bears a little mirror for light reading. It is attached along its length in the middle of suitable for hanging filament or on solid balanced clock system consisting of axle, ball-bearings, and spring line. The long vertical filament presents the needle of the system, which serves as a pointer for mechanical display.

With his scientific and applied activities Georgi Nadjakov emerges as a world recognize scientist in the field of the theory, technics, and applied electrometry. From the other hand, the multilateral scientific and organization activity of Georgi Nadjakov makes him the most bright and deserved scientist in the field of the physics in the 20 century. His scientific and public achievements assure Georgi Nadjakov's monument to be located at the entrance of the second Scientific Complex of the Bulgarian Academy of Sciences now.

The especially valuable is his thought about the creative possibility of the scientific ideas: *“The idea is the most important basis for great scientific achievements”*. For his total creative deed Georgi Nadjakov receives the deserved world renown. He was a corresponding

member of the Göttingen Academy of Sciences (1940), a member of the International Commission on the physical and chemical constants (1947), a foreign member of the Academy of Sciences of USSR (1958), a member of the American Association for Advance of Science (1965), as well as a member of the International Biographical Center in Cambridge, England. The eminent scientist and a remarkable person, organizer of the Bulgarian physics and technics, Georgi Nadjakov, will remain forever with deservedly place in the world.

Translated by A. Karastoyanov

References

* In this 2011 year 115 years have elapsed since the birth of Georgi Nadjakov, the patron of the Institute of Solid State Physics at the Bulgarian Academy of Sciences.

1. П. **Симова** (съст.), Георги Стефанов Наджаков, *Бележити български физици*, Народна просвета, София (1981) 51- 102.
2. Ю. **Храмов**, Георги Стефанов Наджаков, *Физици*, Биографична енциклопедия, Наука и изкуство, София (198) 249-250.
3. Георги Стефанов Наджаков, *Енциклопедия България*, т. 4, М-О, Изд. на БАН, София (1984) 408-409.
4. С. **Иванов**, П. **Лазарова**, *Очерк за Георги Наджаков*, Библиотека “Видни университетски учени”, Университетско издателство “Климент Охридски”, София (1989).
5. К. **Коленцов**, *Постижения на приложната физика в БАН*, Акад. изд. Проф. М. Дринов, София (2010) 25-34.
6. Патентно ведомство на Р. България, База компютърни данни за признатите и отхвърлени изобретения, намиращи се в Централната патентна библиотека, София, Патентната дейност на Георги Стефанов Наджаков е под № 40 826 с отразени две изобретения и едно откритие.