

## Contributions and Achievements of Razum Andreichin in Various Fields of Physics



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**Abstract.** In the present work, the multilateral activity of Razum Andreichin is exposed. This activity is in different institutions but mostly in Sofia University and Bulgarian Academy of Sciences. He has service in the creation, defences and development of the physics of dielectrics and semiconductors, including vitrious semiconductors, agrophysics, photometry, colorimetry, optical metrology. He is discoverer together with Georgi Nadjakov of the contact – potential photovoltaic effect in wide gap semiconductors and discoverer of the photoelectric state in vitrious semiconductors.

Physics, chemistry and biology are basic sciences, which contribute to the development and prosperity of society, technology and industry. Especially physics received special large progress and development in Bulgaria after creation of the Institute of Physics at the Bulgarian Academy of Sciences in 1946.



Razum Andreichin\* is a remarkable scientist and one of the founders of experimental and applied physics in Bulgaria. He is the first staff member of the Institute of Physics at the Bulgarian Academy of Sciences. He is an eminent Bulgarian physicist. He worked in experimental and applied physics in the twentieth century and has a merit in its direct connection with technics and industry in our country.

Razum Andreichin (9 April 1911 – 26 September 1997) was born in the town Gabrovo called Bulgarian “*Manchester*”. He came from teacher’s family. After graduation with honors of Aprilov secondary school in 1923, he matriculated and studied physics in the Faculty of Physics and Mathematics at the Sofia University, which he finished in 1933. Ever as a student, Razum Andreichin had emphasized interest to scientific investigations in various fields of physics – meteorology, magnetism, and astronomy.

In the beginning of his creative career Razum Andreichin was probationer-teacher in 1934 – 1935, and from 1936, he was a teacher on physics in IV secondary man school in Sofia. He was appointed an assistant professor in “*Experimental physics*” department of the Faculty of Physics and Mathematics at the Sofia University in 1937. Later he became a post-graduate student of Georgi Nadjakov on the problems of photoelectric phenomena. Razum Andreichin defended a dissertation “*On the origin of the electromotive force in the photovoltaic effects*” in 1940. He was the second Bulgarian Doctor on Physics and the first successfully defended PhD student in the field of experimental physics in Bulgaria. Razum Andreichin became assistant professor in the Department of Astronomy in 1941. He was co-author of the secondary textbook, printed in 1945 and having five editions after that.

Razum Andreichin was appointed in new founded Institute of Physics at the Bulgarian Academy of Sciences in 1946. He was assistant in its first section in the following 1947. He was elected for professor in 1963. Razum Andreichin took part in the activity of the Institute of Physics, BAS, being scientific secretary (1950 – 1953) and vice director (1954 – 1959) [1-3].

Razum Andreichin conducted considerable scientific organization, expertise and consultancy activities in the field of light technics, photometry, colorimetry and the optical metrology. In 1964, together with Kiril Bogatev from Technical University in Sofia and Todor Kehlibarov from the Institute of Physics – Bulgarian Academy of Sciences, Razum Andreichin initiated establishment of the Commission on Illumination at the State Committee for Scientific and Technological Progress in 1964. It was reorganized to National Committee on Illumination in Scientific technical Union of Electrical Engineering in 1970. Commission on Illumination was adopted to ordinary membership of the International Commission on Illumination (Commission International d’Eclairage – CIE, ICL) with main office in Washington, USA, and later in Vienna, Austria since 1967. Razum Andreichin was a board member of the National Committee of Illumination for the period 1964 – 1989, and for two terms was its vice-president (1979 – 1989). He was also a member of the technical committees of International Commission on Illumination in the preparation and development of documents, which became standards in different countries later. He was also head of the section “*Photobiology and photochemistry*” International Commission on Illumination. His work was significant in organizing national and international conferences on lighting.

After 60 years of the twentieth century, a large part of his scientific and applied activities was related to obtaining, investigation and application of amorphous glassy chalcogenide semiconductors. It is necessary to emphasize, that Pazum Andreichin, together with the world scientists N. Moot, C. R. Ovshinsky, B. T. Kolomiets, V. M. Lyubin, Ya. Tauts, A. M. Andriesh and others, is one of the pioneers in this scientific and applied field of physics. The results of scientific investigations in this field Razum Andreichin published in more than 60 publications and report on national and international conferences and prestigious international journals.

In 1980, Razum Andreichin and Todor Kehlibarov created group “*Color and optical measurements*”, which in 1994 was renamed the “Color” group – Bulgaria. It became a non-profit association, where specialists from different branches worked in colorimetry.

Razum Andreichin was the author and co-author of more than 150 scientific papers in national and international journals. He had two officially non-affirmed but effective discoveries and three inventions. He wrote more than 200 popular articles and reviews, 13 textbooks, school appliances and popular books. Together with G. Nadjakov, he discovered the contact-potential photovoltaic effect in high-resistance semiconductors and the photoelectret state in glassy semiconductors [4-9].

Razum Andreichin is co-author of two new physical effects that are not registered in the Patent Office of Bulgaria but are recognized by the Physical Society at home and abroad for discovery. First of them concerned the contact-potential photovoltaic effect in high-resistance semiconductors. It is named Nadjakov-Andreichin effect and was investigated

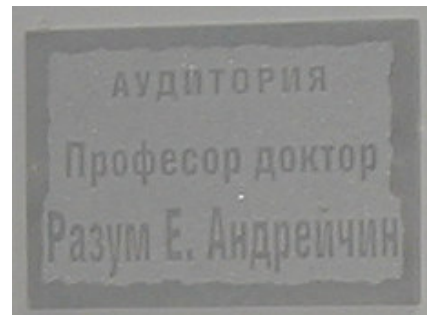
during 1941 – 1951. Andreichin discovered the second effect about photoelectret state of some glassy semiconductors in 60s of the twentieth century.

Razum Andreichin was a good inventor. He constructed new methods, semiconductor devices, and photo-resistors namely: “*Method for production of practically non-inertial and non-aging photo-resistors from evaporated cadmium sulfide*”; “*Sensitive in the blue region and non-aging photo-resistors and a method for their production*”, and “*Position-sensitive photo-resistor device*” during 1967 – 1974. His semiconductor devices found application for registration of light emission and for measurement intensity and spectral composition.

Razum Andreichin took part in the creation of the department for brightened optics at the Optical Mechanic Plant – Sofia in the 60s of the last century, He was also a founder and head of the Central Research Laboratory of agro-physics investigations at the Academy of Agricultural Sciences (1963 – 1967). Razum Andreichin headed the implementation on task “*Opto-electron semiconductor devices*” contracted with the State Committee for Science and Technical Progress during 1972.

Razum Andreichin promotes for inclusion in various areas of physics and engineering of large number experts from Bulgarian Academy of Sciences (M. Nikiforova, A. Ivanov, Yu. Stanislavova, S. Balabanov, T. Kehlibarov, B. Kandilarov, P. Ivanova, G. Getov, M. Tutekov, N. Filova, P. Simidchieva, D. Minev, E. Scordeva, M. Baeva, L. Yourukova, K. Gesheva, S. Alexandrova, D. Arsova etc) and some universities (V. Konstantinova, V. Ilieva, A. Ivanova, D. Platikanova, S. Armensky, Ts. Kyurkchieva, P. Stoyanova, L. Lasov, G. Ivanov etc) and heded their affirmation as scientists.

Razum Andreichin was awarded with many prizes and medals for his multilateral scientific research, teaching, discovery, inventive and organization activities. He was awarded with the jubilee medals “*50 Years Sofia University*” (1939) and “*100 years Bulgarian Academy of Sciences*” (1969), the “*Cyrille and Methodius*” – I degree (1971), a badge of honor of Bulgarian Academy of Sciences (1976), “*Red banner of Labour*” (1981), honorary member of the group “*Color*” – Bulgaria and Institute of Solid State



Physics - BAS (2001). The auditorium 2703 at the Technical University in Gabrovo, where he taught physics of semiconductors from 1974 to 1978, bears his name since 2004 [10-20].

Razum Andreichin was strongly attached to Nature and spented a large part of his free time in mountains. Besides the professor, he was remarkable photographer. He had a large number of top quality cameras and personally developed negative films and made photos of natural and mountain objects.

Razum Andreichin is one of those scientists and organizers of physics in Bulgaria during the second half of the twentieth century that contributed this science to dispose with considerable material base and more large possibilities for research. This allows the Bulgarian physics to involve and take a worthy place in the European and world physics and leave a lasting mark on its various aspects - experimental and applied physics of dielectrics

and semiconductors, light technics, optoelectronics, photometry, colorimetry, optical metrology, and agricultural physics.

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## Reference

\* In April 2011, 100 years have elapsed since the birth of Razum Andreichin.

1. G. **Nadjakov**, R. **Andrejtschin**, Über die Klassifikation der Photovoltaischen Effekte und die Einordnung des kontaktpotentialen Photovoltaischen Effekte, *Comptes Rendus de l'Académie Bulgare des Sciences*, 13(2) 5-18 (1960).
2. Г. **Наджаков**, Р. **Андрейчин**, Контактно-потенциональный фотовольтаический эффект, *Известия на ФИАНЕБ*, 8, 5-18 (1960).
3. В. **Хрисгов**, Н. **Бъчваров**, *Електричество от слънчеви лъчи*, Екскурзия из атомния център, Народна просвета, София (1963) 15–19.
4. Р. **Андрейчин**, С. **Александрова**, М. **Баева**, Е. **Скордева**, Л. **Юркова**, *Аморфным, жидким и стеклообразным полупроводникам*, Доклад конференции, София (1972) 11-14.
5. Р. **Андрейчин**, М. **Никифорова**, Е. **Скордева**, М. **Баева**, Л. **Юркова**, *Аморфным, жидким и стеклообразным полупроводникам*, Доклад конференции, София (1972) 15 – 19.
6. *Сто години Българска академия на науките 1869 – 1969*, т. III, Професори и старши научни сътрудници, Природо-математически и приложни науки, София (1972) 30-33.
7. Р. **Андрейчин**, Е. **Скордева**, М. **Баева**, Л. **Юркова**, Д. **Арсова**, *Доклади на първата национална конференция по колориметрия*, Варна (1973) 87-92.
8. Р. **Андрейчин**, М. **Никифорова**, Е. **Скордева**, М. **Баева**, Л. **Юркова**, *Докладов международной конференции по високоомных полупроводникам, фотоэлектретам и электрофотографии*, Варна, България (1973) 20-35.
9. Р. **Андрейчин**, *Енциклопедия България*, БАН, София, т. 1, (1978) с. 84.
10. Р. **Андрейчин**, П. **Стоянова**, Л. **Лазов**, *Аморфные полупроводники*, Докладов конференции, Габрово, България (1984) с. 159.
11. Разум Екимов Андрейчин, Физико-математическа секция на Съюза на научните работници в България, *Информация за дейността на секцията и нейните членове*, София (1984) с. 17.
12. С. **Иванов**, П. **Лазарова**, *Очерк за Георги Наджаков*, Унив. Изд., София (1989) с. 36, 58-60, 69, 82, 97, 111-112.
13. В. **Пенева**, Разум Андрейчин а 80 години, *Светът на физиката*, 14(4) 253-254 (1991).
14. К. **Коленцов**, Разум Андрейчин на 85 години, *Светът на физиката*, 19(3) с. 179 (1996).
15. Р. **Андрейчин**, Физиката в БАН на 50 г., *Светът на физиката*, 19(3) 180-182 (1996).
16. К. **Коленцов**, Проф. д-р Разум Андрейчин – забележителен учен и изобретател, Български изобретатели, *Интелектуална собственост* (3) 30-31 (2003).
17. Д. **Христов** (съст.), *Физиците, завършили физикоматематическия факултет на СУ “Св. Климент Охридски”*, изд. Фактум, София (2005) с. 7.
18. К. **Коленцов**, Проф. д-р Разум Андрейчин: Възход на приложната физика и светотехниката, Каквото можах, направих!, *Детонация*, март (2009), с. 5.
19. К. **Коленцов**, Приносът на проф. д-р Разум Андрейчин в различни области на науката и техниката в България, *Постижения на приложната физика в БАН*, Академично изд. “Проф. Марин Дринов”, София (2010) 46-52.
20. Материали за многостранната дейност на проф. д-р Разум Андрейчин, Издирил и събрал Крум Коленцов, част I, 2004, част II.