https://gigancinauki.pl/ge/biographies/8293,Maria-Sklodowska-Curie.html
26.04.2024, 01:23

Maria Skłodowska-Curie

Maria Skłodowska-Curie (September 7, 1867, Warsaw - July 4, 1934, Sancellemoz, France), was a chemist and physicist, co-founder of the science of radioactivity. She was the daughter of Władysław, a physics and mathematics teacher, and Bronisława Boguska, the head of a girls' school.

When she was 10, she began her education in the third grade of a girls' school, but after a year she moved to the 7th grade in Women's Junior High School No. 3, from which she graduated in 1883 with a gold distinction. Then she spent a year with her family in the countryside. She was not able to continue her studies in Warsaw because the Warsaw Imperial University did not accept women at that time. Maria and her older sister Bronisława decided to go to Paris to study at the Sorbonne. Bronisława was to leave first, and Maria was to start working and helping her financially. First, she worked for an attorney in Warsaw, and then for three and a half years she was a governess at the Żorawski estate near Płock. There she met and fell in love with their son, K. Żorawski, which was reciprocated. However, his parents did not consent to his marriage to a poor governess. If Maria had become Mrs. Żorawska, the history of physics and chemistry would have been completely different.

After returning to Warsaw in 1889 S.C. deepened her knowledge of chemistry and physics using the workshop of the Museum of Industry and Agriculture run by her cousin J. Boguski. In November 1891 she left for Paris and began studies at the Sorbonne. Soon, in July 1893, she obtained a bachelor's degree in physical sciences (with top marks in her class), and a year later, she earned a bachelor's degree in mathematics. During a party at J. Kowalski-Wierusz's house, she met Pierre Curie and married him in July 1895.

She finished her first scientific paper on the magnetic properties of hardened steel in December 1897. It was a paid position and a fairly standard job, made to order from the industry, but the results turned out to be so interesting that academician Albert Potier presented it on December 12 that year at the meeting of the French Academy of Sciences.

Looking for a topic for further research, S.C. drew attention to the phenomenon of uranium radioactivity, discovered in March 1896 by Henri Becquerel. However, he then announced that the radiation of uranium compounds could be reflected, refracted and polarized, and was therefore considered a type of electromagnetic radiation with very short wavelengths. Interest in this phenomenon declined significantly, and physicists, including Becquerel, turned to 'more interesting' topics. Nonetheless, S.C. decided first to undertake systematic tests of all available substances to look for those that have the property of radioactivity, and second, to test all available minerals and uranium compounds to see if their radiation intensity is proportional to their content of this element. Instead of Becquerel's subjective photographic method, quite uncertain due to the quality of the plates of the time, she used an objective and accurate method for the first time, measuring the intensity of the radiation with an electrometer that Pierre Curie and his brother Jacques had constructed long before that for piezoelectricity studies.

She obtained permission from the director of the Municipal School of Chemistry and Physics, where her husband was employed, to conduct measurements in the local laboratory. After less than 4 months of research, she already had written an article about the rays emitted by uranium and thorium compounds: *Rayons émis par le composés de l'uranium et du thorium*. It was presented by Gabriel Lippmann at the meeting of the Academy of Sciences on April 12, 1898.

It was this publication that started a revolution in science. S.C. concluded that most of the uranium compounds tested do emit radiation proportional to the uranium content; two minerals, however — the so-called pitchblende (uraninite) and chalcolite — show radiation much greater than it would appear from their uranium content. She synthesised chalcolite from its known components and found that this synthetic chalcolite has the activity that results from its uranium content. Therefore, she put forward the bold hypothesis that there must be some unknown elements with a strong radioactivity in natural chalcolite and tar blende. She decided to test this hypothesis in further research. On the way, she discovered that among the many examined elements and compounds, only thorium compounds exhibit radioactivity (this property of thorium was also discovered independently by the German physicist Gerhard Schmidt).

Due to the attractiveness of the topic resulting from Maria's research, Pierre Curie stopped his research on magnetism and joined her. Already in July 1898, in the paper entitled *About a new radioactive substance found in tar blende*, the Curies reported the discovery of a new radioactive element, for which they proposed the name polonium, 'from the name of the motherland of one of us' - as they wrote; it was a political demonstration because Poland was then still divided between the three oppressors. In this paper, the term 'radioactivity', proposed by S.C., was used for the first time to describe the properties of radiation emission. In December 1898, the Curies and their assistant Gustav Bémont discovered another radioactive element called radium. These results generated a great deal of interest and re-attracted researchers' attention to radioactivity. Becquerel, after repeated research, took back his erroneous results from March 1896. It turned out that the radiation of uranium, thorium, polonium and radium opens the way to study the structure of matter at the intra-atomic level. However, it was difficult for scientists at the time to accept the idea that atoms themselves could be the source of such great energy.

After three years of work, the Curies managed to obtain 0.1 g of radium chloride in 1902, which was enough to determine the atomic mass of radium. In 1903, the Curies were awarded the Nobel Prize in Physics, independently of Becquerel. In the same year, S.C. was awarded her PhD, following which she became the head of the laboratory at the Department of Physics established at the Sorbonne especially for her husband. After Pierre Curie's tragic death in a street accident in 1906, she succeeded him as chairman. She was the first woman to become a professor at the Sorbonne. In further research carried out in her laboratory, metallic radium was obtained, and methods of obtaining radioactive substances and methods of precise measurements of their activity were developed. For these results, S.C. received her second Nobel Prize in 1911, this time in the field of chemistry. On her initiative, in 1912 construction was started on the Radium Institute, where she worked until her death. During World War I, she organised a radiological service for the needs of military hospitals and took an active part in it together with her daughter Irena, who later became an outstanding scientist and a Nobel Prize winner as well.

Skłodowska-Curie was one of the most eminent and respected scientists of her time and took part in the exclusive Councils of Physics (the so-called Solvay Congresses) organised on the initiative of the Belgian industrialist Ernest Solvay. Several times she put forward bold physical hypotheses that were not always appreciated by contemporaries. In 1911 she expressed the view that the source of radioactivity was the innermost part of the atom, its nucleus. She suggested the existence of, apart from charged particles, also neutral projectiles for the study of the nucleus of an atom. In 1921, she expressed the idea of the existence of non-Coulombic forces of attraction in the nuclei (this view was only accepted after the discovery of the neutron in 1932).

Skłodowska-Curie had French citizenship, thanks to her marriage, and worked in her adopted country until the end of her life, but she maintained close ties with Poland. At the invitation of TNW, in 1912 she took over the remote management of the Mirosław Kernbaum Radiological Laboratory in Warsaw and in 1913 sent her assistants JK Danysz and L. Wertenstein there, to represent her at the laboratory. She has contributed greatly to the development of research on radioactivity in Poland. Polish scholarship holders were always working at her Institute in Paris. At the 1932 grand opening of her inspiration, the Radium Institute, S.C. presented to the Institute 1 gram of radium purchased from the funds collected from donor contributions.

Skłodowska-Curie died of pernicious anaemia and was buried in the Curie family grave in Sceaux near Paris. Her and her husband's coffins were transferred in 1995 to the Pantheon in Paris.

E. Curie: *Maria Curie*, Warsaw 1938 (book reprinted several times after World War II); F. Giroud: *Maria Sklodowska-Curie*, Warsaw 1987; J. Hurwic: *Maria Skłodowska-Curie i promieniotwórczość*, Warsaw 2001; J. Piskurewicz: *Między nauką a polityką. Maria Skłodowska-Curie w laboratorium i w Lidze Narodów*, Lublin 2007; S. Quinn: *Życie Marii Curie*, Warsawa 1997; *Wkład Marii Skłodowskiej-Curie do nauki*, ed. J. Hurwic, Warsaw 1954.

Andrzej Kajetan Wróblewski

Previous Page
Next Page