



Medical innovation through chemistry

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The year 2011 is the “International Year of Chemistry.” Under the unifying theme of “Chemistry—our life, our future,” the Chemical Society of Japan as well as other related societies are all carrying out attractive activities to promote chemistry’s future development and contribution to society. The year 2011 was assigned as the International Year of Chemistry mainly because it marks the very 100th anniversary of the Nobel Prize in Chemistry awarded to Madame Curie “for the discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element.” Madame Curie, in fact, not only discovered the radioactive isotope but also applied its emitted radiation to medicine. That is to say, she has been credited for the significance of also founding today’s radiation diagnosis/treatment (nuclear medicine). Radioactive treatment of malignant tumor became a major research theme for the Curie Institute (Radium Institute) founded in Paris, such that a hospital specializing in radiation diagnosis and treatment was built adjacent to the Institute. The time just happened to be amidst the First World War. Madame Curie recognized the effectiveness of radiography (X-rays) in diagnosing wounded soldiers in the battlefield. Believe it or not, it is said that she remodeled a car, which was becoming popular at the time, into an X-ray medical check-up car, obtained herself a driver’s license and drove through battlefields, and made every effort to diagnose and treat wounded soldiers. Moreover, she is said to have even studied car maintenance and anatomy, at the fact of which I could not help being surprised. Even given the special circumstances of war, I can see that she was a real chemist who devoted herself to the benefit of society and led medical innovations of the time. Today, people are much more aware of the benefits of scientific and

technological achievements to society. However, it is astonishing that Madame Curie, while founding the basis of radiochemistry a hundred years ago, was on the other hand very active in applying her achievements to the benefit of society.

Aside from Madame Curie’s case, examples of the central role played by chemistry in “Life Innovation” are too numerous to be mentioned. It is obvious that many groundbreaking discoveries on synthetic organic reactions, including the cross-coupling reaction, have led to the innovation of various developments in drugs and medicines. Meanwhile, if we turn our eyes to medical devices, materials chemistry plays a big role here as well. The development of biomaterials that do not evoke foreign-body reaction when inserted into the body and provide excellent functional properties was indispensable to the progress thus far of catheterization (the Nobel Prize in Physiology or Medicine 1956), which enables monitoring of inside the body and in recent years even surgery from inside blood vessels. Chemistry, together with the advances in nanotechnology, is now on the verge of making it possible to integrate the sequence of functions of sensing → processing → operation, possessed by conventional large-size devices, into supramolecular devices about the size of a virus. I strongly believe that such devices shall in the future bring about medical innovations that transcend the conventional scope of medicine and devices.

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The *Kagaku to Kogyo* (Chemistry & Chemical Industry) Editorial is responsible for the English-translated article.