Stony Brook University
Department of Chemistry
54th Departmental Convocation
Friday, May 17, 2024
Albert Haim, Professor Emeritus
"Inorganic Chemistry and Me."

First, I want to thank Chemistry department chairman Stan Wong for his kind introduction and for the invitation to be the chemistry convocation speaker for 2024. I feel truly honored. I also want to acknowledge Norma Reyes and Katherine Hughes for their invaluable help that made it possible for me to be here today.

Good morning graduates, parents, fellow faculty members and guests.

To the graduating students: this day represents an inflection point in your life. You have my best wishes for a fulfilling and intellectually challenging future.

I am certain that you received a first-class education at Stony Brook and are ready to make your own contributions to chemistry or the field you choose in the new chapter of your life.

I am delighted for the opportunity to tell you about my own life. I was and still am an inorganic chemist. Inorganic chemistry is the field of science concerned with the properties of all the elements in the periodic table except carbon. My love affair with Inorganic Chemistry began in 1945 at the French high school I was attending at the time. I was fascinated by the colors of fireworks. So I asked Monsieur Marcel Hillion, my chemistry teacher, what were the sources of the different colors in fireworks. His answer: add metallic salts to gun powder. He suggested that I bring to class gun powder spiked with different metal salts.

So I went to my local pharmacy and bought sulfur and potassium nitrate. The third ingredient of gun powder is charcoal that I had at home. I also bought small amounts of copper sulfate for blue, barium chloride for green, strontium chloride for red. I made three batches of gun powder with the inorganic salts added and fired them in the chemistry class. The teacher and the students enjoyed the colorful light show tremendously! That was 1945. It was a different time and a different culture. Anyway, that was my first experiment in Inorganic Chemistry.

From 1949, when I started college, until 2001, when I retired, Inorganic Chemistry was a keypart of my life. My PhD work at the University of Southern California and my postdoctoral work at Stanford University with Professor Henry Taube (winner of the Nobel prize in chemistry in 1983) dealt with kinetic and mechanistic studies of coordination compounds. These are inorganic materials with fascinating properties and, incidentally, beautiful colors.

After I finished my postdoctoral work I began my independent academic career first at Penn State from 1962 to 1966 and then at Stony Brook from 1966 to 2001. My research, carried out with undergraduate, graduate and post-doctoral students expanded our understanding of inorganic reaction mechanisms, in particular electron transfer reactions, a fundamental subject in several fields. The electrochemical processes in batteries are electron transfer reactions which are also critical to photosynthesis and respiration.

In 1990 I received a phone call from the editor of the American Chemical Society journal Inorganic Chemistry. He invited me to join him as an associate editor. Needless to say I accepted and for the next dozen years I carried out peer reviews of about 2000 articles. That was in addition to my duties as teacher and researcher. But when you have a passion for your activities, they are not work, they are a pleasure.

Perhaps the best-known branch of chemistry is Organic Chemistry, which plays a critical role in the development of drugs and plastics. This was summed up in the famous advertising slogan of the du Pont Company: “Better Things for Better Living Through Chemistry” which made its debut in 1938 as du Pont introduced a revolutionary product of organic chemistry: nylon.

But let me remind you that Inorganic Chemistry is all around us too. Take a look at your cell phone: it contains about forty elements from the periodic table including some rather unusual ones such as indium, tantalum and several rare earth metals. The key inorganic chemicals in LEDs—Light Emitting Diodes—are compounds of gallium. Lithium rechargeable batteries are everywhere. A typical electric car battery contains lithium, aluminum, nickel, iron, copper, manganese, graphite and cobalt. There is a lot of Inorganic Chemistry going on there.

An important new field of Chemistry is being developed. In about two months, the American Chemical Society will launch a new journal titled “Artificial Photosynthesis.” Take a look at this seemingly modest tree leaf. It is green because it contains chlorophyll, a bio-inorganic compound that contains a magnesium ion coordinated to the nitrogen atoms of a porphyrin in a geometric structure similar to the coordination compounds I researched during most of my academic life. In photosynthesis, six molecules of carbon dioxide and six molecules of water plus photons from sunlight yield one molecule of sugar and six molecules of oxygen. Carbon dioxide and water are highly stable and unreactive inorganic compounds, so it is rather amazing that a leaf can carry out the reduction of carbon dioxide and the oxidation of the oxygen in water. Incidentally, carbon dioxide and water are the products of the reaction of gasoline with oxygen in internal combustion engines. Fossil fuels are in limited supply and are needed to produce the precursor chemical compounds used in

the pharmaceutical and chemical industries. As a matter of fact, 12 % of fossil fuel is used to produce the chemical compounds used in clothing, tires, digital devices, packaging, detergents, plastics, fertilizers and countless other everyday items.

Alternative, sustainable sources of energy can help to preserve petroleum as a source of the chemical compounds essential to our modern civilization. By mimicking natural photosynthesis we can convert and store abundant solar energy in the form of chemical energy. Inorganic compounds of dozens of elements in the periodic table are essential ingredients in solar energy conversion.

I could go on, but as you can see the whole world is chemistry, and an exciting adventure lies ahead for all of you. I will close by extending my congratulations to the graduating students of the Stony Brook class of 2024.