In 1930 Dr. Kroll became interested in the reduction of titanium and initially investigated the reduction of $TiCl_4$ with sodium in a flash reaction process, but stated that this process would never become commercial on account of the high pressures created by such a reaction. He then looked at the reduction of $Ti0_2$ and ZrO_2 with pure calcium under an argon atmosphere in 1935.

In 1937 he started his first experiments on the pressureless reduction of $TiCl_4$ with calcium under an argon atmosphere and produced 250 grams (88% yield) of cold ductile titanium. On July 30, 1937 Dr. Kroll first experimented with the use of magnesium as a reductant for $TiCl_4$, eventually producing titanium of 180 Brinel hardness using a large stainless steel reactor. On July 13, 1938 he produced zirconium from a similar reaction involving zirconium chloride reduced with magnesium using the same equipment, and vacuum separation of the sponge zirconium from the surplus chloride.

In the Autumn of 1938 W. J. Kroll visited the U.S.A. in an effort to sell his titanium reduction process taking his titanium samples with him (Figure 5). Unfortunately, he found no interest and "left the United States in a sad state of mind, not having been able to interest anybody in my ideas".

While working on his main projects, Kroll was frequently interrupted to examine other process metallurgy areas. A sample of these include: iron-beryllium age hardening alloys; partial substitution of nickel for beryllium for providing increased hardness and grain refining; substitution of titanium or aluminum for beryllium in nickel-steels to