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The President's Committee on the National Medal of Science

Gentlemen,

I wish to support the nomination of Dr. H. Tracy Hall for the National Medal of Science. I believe that his outstanding work in super high pressure fully qualifies him for this honor.

There have been two giants in the super high pressure field. First, there was Dr. Percy Williams Bridgeman, who received the Nobel Prize in 1946 for his pioneering work. He may truly be designated the "grandfather" of this field. By the end of his career he was able to achieve 400,000 bars <six million psi>. Yet the holy grail of this field, the synthesis of diamonds, eluded him, since at the required temperature of 2000 C, his best apparatus could only reach 33,000 bars <500,000 psi>.

It required the genius of Dr. H. Tracy Hall to provide access to the super high pressure field by not just one but two different approaches which to this day remain the only practical techniques. First, in 1954, at the General Electric Co., he conceived the "belt" apparatus, capable of simultaneously producing a pressure of over 70,000 bars <one million psi) and a temperature of over 2000 C. This was awarded a US patent in 1959. With this apparatus he was the first to produce synthetic diamond by a reproducible process which was rapidly placed into commercial usage and which today supplies some 70 percent of the diamonds used in industry.

When propriety considerations subsequently prevented him from utilizing his discovery, he invented multi-piston arrangements to achieve the same ends, also awarded a US patent in 1969. These various inventions opened the field of super high pressure and temperature and have been widely used by a host of scientists and engineers ever since. With these inventions he can truly be designated the "father" of this area.

In 1972 the American Chemical Society awarded him its Gold Medal for Creative Invention, with the citation stating:

. . . for being the first to discover a reproducible reaction system for making synthetic diamonds from graphite, and for the concept and design of a super high pressure apparatus which not only made the synthesis possible, but brought about a whole new era of high pressure research . . .

In addition to these inventions he made many significant contributions to super high pressure, high temperature science, including the first determination of a melting curve and of certain types of phase changes. He was the first to study X-ray diffraction of materials under these extreme conditions. He has studied the science of many materials under such conditions, with many fruitful results including the synthesis of sintered synthetic diamond in 1970.

I have followed the work of Dr. Hall in this field during my 30 years of research in the physics and chemistry of materials at the AT&T Bell Laboratories in Murray Hill, NJ. (I retired in 1969, with 16 patents granted and having published three books and over 400 articles.) I also know that Dr. Hall is equally highly regarded by other scientists knowledgeable in this field.

In view of his innovative vision as well as his scientific studies in the super high pressure and temperature field, I believe that Dr. H. Tracy Hall is fully worthy of the National Medal of Science.

Yours very truly,
Kurt Nassau, Ph.D.