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In Celebration

Professor Bud Peterson on his 60th birthday

It is a great pleasure to celebrate the achievements of Dr. G.P. 'Bud' Peterson, president of the Georgia Institute of Technology, on his 60th birthday. President Peterson is a distinguished scholar in the heat transfer community and more broadly, he is a leader in shaping higher education in the United States. Most professionals in the academic community have to make a decision at some point in their career between the diverging paths of being a teacher and researcher, or working as an administrator. President Peterson has found a home in each of these disparate areas and has flourished in both.

From football player to chancellor. President Peterson was born in Palo Alto, California on September 1, 1952, and moved with his family to Prairie Village, Kansas, a suburb of Kansas City. At Shawnee Mission East High School he excelled academically and athletically, lettering in football, basketball, and track. He subsequently went to Kansas State University in Manhattan, KS, where he played football, first as a walk-on and later as a scholarship athlete. As a three year letterman, he started 26 games at a tight end/wide receiver from 1970 to 1974, catching 30 passes for 359 yards. In 1973, he helped the Wildcats beat the University of Colorado in an exciting finish at Folsom Field on the Boulder campus. Little did he know that he would someday be the chancellor there 33 years later.

President Peterson met his sweetheart, soul mate, and wife of 38 years, Val, in 1971, and they married in May 1974, just prior to their senior year. In 1975, he graduated from Kansas State with a B.S. in Mechanical Engineering and in 1977 received a B.S. in Mathematics. While attending as a part time student and working full time, he earned an M.S. in Engineering in 1980. He and Val then moved to Texas A&M University, where he worked as an Assistant Professor in the Engineering Technology Department, while at the same time pursuing his doctorate in Mechanical Engineering, which he completed in 1985.

Combining research with administrative tasks in academia. Professor Peterson's career in academia began in 1979 at Kansas Technical Institute in Salina, Kansas where he worked as an associate professor and head of the General Engineering Technology Department. His research contributions to the fields of two-phase heat transfer and heat pipe development, began early in his career during the summers of 1981 and 1982 while he was a visiting research scientist at NASA's Johnson Space Center in Houston, Texas. His research included determining the priming capability of high-capacity heat pipes in reduced gravity environments. Following the completion of his Ph.D. in 1985, he was appointed as an assistant professor of Mechanical Engineering at Texas A&M University. Professor Peterson was subsequently promoted and tenured as an associate professor in 1988 and full professor in 1990. Other positions during this time included serving as the head of the Thermal and Fluid Sciences Division in 1989, Halliburton Professor of Engineering from 1990 to 1991, Tenneco Professor of Mechanical Engineering from 1991 to 2000, and head of the Mechanical Engineering Department from 1993 to 1996.

In 1996, Professor Peterson was appointed Texas A&M's executive Associate Dean of Engineering and also served as the Associate Vice Chancellor for the Texas A&M University System in 1996. From July 2000 until June 2006, Professor Peterson served as the provost at Rensselaer Polytechnic Institute in Troy, New York.

In 2006, he was appointed as chancellor at the University of Colorado at Boulder where he served until his appointment as the 11th president of the Georgia Institute of Technology in 2009.

A pioneer in micro heat pipe development. Professor Peterson has made outstanding and lasting contributions to the areas of heat pipes, two-phase change heat transfer, microchannel flow and heat transfer, and the behavior of complex fluids. One exceptional contribution was his pioneering research on micro heat pipes. Professor Peterson developed the first silicon micro heat pipes embedded in silicon wafers. These devices had a hydraulic diameter of less than 50 μm and could achieve an effective thermal conductivity many times greater than that of the silicon wafer, depending upon the packing density.

As early as the 1990s, Professor Peterson realized that the integration of cooling technologies directly to the silicon wafer was one of the most effective ways to efficiently reject the heat generated from microelectronic components. Professor Peterson demonstrated that vapor-deposited micro heat pipe arrays fabricated as an integral part of semiconductor devices could act as highly efficient heat spreaders, by reducing the thermal path between the heat sources and heat sinks. Fabrication of these micro heat pipes

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in silicon wafers was accomplished using a chemical etching process, vapor deposition process to match the CTE (Coefficient of Thermal Expansion), UV bonding, and accurate-control of the working fluid charge. These micro heat pipe arrays, immediately raised the bar in the field of heat pipe research to a new level and more importantly, demonstrated the importance of interdisciplinary research and microscale heat transfer.

Together with a number of other colleagues, Professor Peterson organized several of the first conferences on Microscale Heat Transfer. Thanks to his 12-hours-per-day work schedule, he was able to not only conduct extensive scientific research, but also continue to work with his students and complete his first book entitled "An Introduction to Heat Pipes: Modeling, Testing and Applications". This innovative textbook introduced a wide range of micro/miniature heat pipe applications to microelectronic systems and components, thereby opening up a whole new field within the heat transfer industry.

As early as 1997, Intel's Architecture Platform Research Lab asked Professor Peterson if it was possible to demonstrate a low-cost heat pipe cooling technology for use in future Intel processors. At that time, no one was using the heat pipe for the computer cooling. Although it was well known that state-of-the-art heat pipes could provide extra-high effective thermal conductivity, the fabrication cost was too high. Most heat pipe applications at that time were related to aerospace and military needs.

The multi-year project entitled "Low Cost Thermal Management for Desktop Computers" funded by Intel enabled Professor Peterson and his research team to demonstrate that a low-cost heat pipe could be developed and could meet the thermal management requirements of the new Intel chips.

Eventually the low-cost grooved/sintered heat pipes were employed in a wide variety of computes that employed Intel microprocessors. Today, almost every laptop or desktop computer on the market has a heat pipe cooling module inside.

Publications and awards. In the area of microchannel heat transfer and fluid flow, Professor Peterson's team developed experimental and theoretical methods to quantify vapor and liquid transport. His pioneering study on the sharp corner regions of triangular and rectangular channels and friction and heat transfer work in 1994–1996 laid a sound foundation for the study of microchannel flow and heat transfer, and was utilized in a wide range of phase change heat transfer and microchannel applications within the electronics, medical, space, and aircraft industries.

Professor Peterson's recent work in heat and mass transfer in complex fluids (nanofluids) has bridged the gap between chemical physics and heat transfer on tailoring the thermophysical transport of materials. Professor Peterson has published his research results in more than 260 journal articles and 16 books, monographs and invited book chapters. In addition, he has lectured and organized short courses for universities, professional organizations, and industries. He holds nine patents with two others pending.

Professor Peterson has received numerous honors and awards for both teaching and research, including the ASEE/DOW Chemical Corporation-Outstanding Young Faculty Award in 1988 and the Texas A&M University Faculty Distinguished Achievement Award for Teaching in 1993. His research awards include the 1990 Best Paper in AIAA Thermophysics and the ASME Heat Transfer Memorial Award in 2001. Service awards include the National Science Foundation (NSF) Management Excellence Award in 1995 and the Frank J. Malina Medal awarded by the International Astronautical Federation in 2005.

Professor Peterson's commitment to mentoring his students and young faculty, along with his genuine curiosity and tireless energy has inspired and guided more than 30 students and many more visiting scientists in their graduate studies and careers. He continually encouraged his students to go beyond their comfort zones. He is an outstanding mentor and scholar, who has inspired his students and those who have worked for him to strive for excellence and high standards in all endeavors.

What distinguishes Bud from many other leading researchers and administrators are his infectious humility and willingness to help despite great demands on his time. One can always depend on him to deliver whatever is needed and to do the best that might be expected. He loves to sit down and discuss research, as well as other issues of the day, with his friends and students, putting them fully at ease. He has always shown a genuine concern and affinity for his fellow researchers and educators. This feeling has been and will always be heartily reciprocated by others.

A Georgia Tech Success Story. Shortly after he assumed the role as Georgia Tech's president, Professor Peterson engaged the Georgia Tech community in developing and implementing a 25-year strategic plan. Launched in conjunction with the Strategic Plan was the public phase of Campaign Georgia Tech, which to date has raised more than $1.15 billion towards a $1.5 billion goal. This effort will help the Institute realize the goals outlined in the strategic plan, add endowed chairs and professorships, scholarships and fellowships, and construct facilities.

In his short time at Georgia Tech, he has realigned and restructured the research organization, communications and marketing and the office of government and community service for greater effectiveness; championed efforts to strengthen the Institute's leadership in innovation; expanded strategic partnerships; and worked to maximize Tech's impact throughout the state, region, nation, and the world.

A Champion for the Underrepresented. As provost at Rensselaer Polytechnic Institute, Professor Peterson played a key role in the institutional transformation and dramatic improvement in the quality, size and diversity of the faculty – overseeing the hiring of nearly 40 percent of the faculty, increasing the total number of tenured and tenure-track faculty by 20 percent, and improving the diversity of the tenured/tenure-track faculty by more than doubling the number of underrepresented minorities and increasing the number of women by 40 percent. In addition, during his tenure as Provost, the quality, size and diversity of the student body increased, with the number of full-time Ph.D. students increasing by 25 percent.

As chancellor of the University of Colorado, Professor Peterson provided leadership and expanded the role of the University. During his three-year tenure, freshman applications increased by 35 percent, the number of underrepresented minorities in the freshmen class increased by 38 percent, sponsored research increased by more than 18 percent and private philanthropy for the university increased by nearly 80 percent.

A leader in national education and research agendas Throughout his career he has helped to establish national education and research agendas in the United States. He has served as a member of a number of congressional task forces, research councils, and advisory boards, including the Office of Naval Research (ONR), the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), the National Research Council (NRC), and the National Academy of Engineering (NAE). In addition, he has served as a member of the Board of Directors and Vice President for Education for the American Institute of Aeronautics and Astronautics (AIAA) and is currently serving as a member of the U.S. Council on Competitiveness.

In 2007 Professor Peterson served on the National Security Higher Education Advisory Board for the Federal Bureau of Investigation. In 2008 he was appointed by U.S. President George W. Bush to serve as a member of the National Science Board (NSB), which oversees the National Science Foundation (NSF) and advises the President and Congress on national policy related to science and

engineering research and education. In 2010 he was named by then U.S. Secretary of Commerce Gary Locke as a member of the National Advisory Council on Innovation and Entrepreneurship (NACIE). In June 2011 he was named by President Barack Obama to the Advanced Manufacturing Partnership (AMP) steering committee.

Throughout his career, he has served on the editorial boards of 14 national and international journals, such as the *ASME Journal of Energy Resources Technology*, the *ASME Journal of Heat Transfer*, the *American Institute of Aeronautics and Astronautics* (*AIAA*) *Journal of Thermophysics and Heat Transfer,* and the *International Journal of Heat and Fluid Flow*. He has served as chair of the Petroleum Division of ASME Executive Committee and the ASME Heat Transfer Division Executive Committee.

From August 1993 to September 1994, he served as an IPA at the National Science Foundation, where he was the program director for the Thermal Transport and Thermal Processing Program. In 2001 Professor Peterson served on the National Academies – Space Studies Board, Committee on Microgravity Research, in Washington, D.C.

As a result of his numerous scientific contributions and administrative leadership, Professor Peterson is recognized as a national leader and is recognized worldwide as a leader in shaping higher education in the United States and internationally.

He is esteemed for his roles as an outstanding professor in teaching and research and for his ongoing leadership role in shaping higher education in the United States. On the occasion of his 60th birthday, it is a great pleasure and honor for his students, colleagues and friends to recognize his distinguished accomplishments. We wish him a very happy 60th birthday!

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