December 2012

Dear Mr. and Mrs. MacDonald,

I am Sayak Banerjee and it is a great privilege to be a recipient of the Daniel W. MacDonald Memorial Fellowship for the 2012-2013 academic year. I would like to express my heartfelt thanks to you for making it possible for me to pursue my research interests at Stanford University.

I am engaged in the experimental study of the combustion chemistry of aviation fuels under Professor C.T. Bowman of the Mechanical Engineering Department of Stanford University. The ultimate motive of this long term research project being conducted simultaneously in several universities spanning multiple disciplines is to develop a comprehensive combustion chemistry mechanism for the wide array of fuel species that constitute the aviation fuel blends in the aircraft industry. Such a databank will not only help us to develop more reliable simulations codes to analyze Jet Engine performance, but will aid in the design of more fuel efficient high performance aircrafts and will go a long way in simplifying our search of satisfactory non-fossil fuel based alternatives for future jet engine fuel blends. As commercial flight operations expand throughout the developing world and electricity and road transport shift to renewable energy sources, the aviation industry will become one of the most significant contributors to hydrocarbon emissions in the near future; hence the need to start now in developing green fuel alternatives that can sustain high powered flights 10-20 years from today. My modest project is aimed at understanding the fuel chemistry of Dodecane (a $C_{12}H_{22}$ hydrocarbon which is one of the major constituents of aviation fuel blends) in the Stanford High Pressure Flow Reactor under different temperature and pressure conditions. Thanks to your generous award I have been able to pursue my research uninterrupted by other worries over the last year. I hope to complete my PhD research by the end of next year, and your financial assistance has helped a lot in keeping my work on track.

I come from India, a country that is growing fast in its hunger for energy but has precious few conventional resources to cope with such needs. It is an immense challenge, but also an opportunity that can spur innovative development in energy technology. I hope to be involved in a revolution in energy technologies that can bring even more prosperity while beating back the threat of climate change and irreversible damage to our global ecosystem. I am an active member of the student run Stanford Energy Club and have been involved in organizing many energy related events on campus to help raise awareness on critical energy issues that affect our world. My eventual goal is to return to my country and use the invaluable experience I have gained here to develop high quality laboratory and research facilities in academia that can spur and nurture the growth of the energy industry in India. Just as Stanford has served as an innovation engine of the Silicon Valley, I hope that academic institutions in India may provide the same foundation in the new energy revolution of the future. I hope to do whatever little I can to contribute to this effort.

My experience at Stanford has been wondrous. I grew up in Calcutta, one of the biggest metropolises in India, but I much prefer the quieter atmosphere of Stanford. I like my research and energy-club activities, but apart from that I like to hike, to camp in the outdoors and nature photography. I love to read books, especially nonfiction writing in science, history and biography. I am a rather regular visitor of the Stanford Library, another of the resources that I