ABSTRACT
The design of polymer electrolytes often revolve around the goal of achieving simultaneously enhanced conductivities and mechanical strengths in the same material. Indeed, electrolytes possessing high conductivities but low mechanical strengths, exhibit undesirable features such as dendrite formation of the metallic lithium anode which leads to short circuit of the electrodes. Unfortunately however, factors that enhance the mechanical strength of a material often leads to a deterioration of the conductivity and vice versa. Hence, there is an outstanding interest in strategies which can simultaneous enhance both the conductivity and mechanical strength of the electrolyte material. In this talk, I will discuss selected results emerging out of our research in using computational techniques to study some strategies which have been examined in this regard: (i) Addition of ceramic nanoparticles to the polymer electrolytes; (ii) Creating block copolymer versions of the polymeric electrolyte; (iii) Use of ionic liquids (either directly or in polymerized form) in the polymer electrolyte; (iv) Tuning the polymer polarity to influence ion transport. In each case, a short overview of the new insights which emerged from computer simulations will be discussed.

BIOGRAPHY
Venkat Ganesan holds the position of Kobe Endowed Professor in the Department of Chemical Engineering at The University of Texas at Austin. He obtained his Bachelor's degree in Chemical Engineering from the Indian Institute of Technology, Madras, and his Master’s and Ph.D. in Chemical Engineering in 1999 from the Massachusetts Institute of Technology. He joined University of Texas in 2001 after spending two years as a postdoctoral fellow at the Materials Research Laboratory in University of California Santa Barbara (with Prof. Glenn Fredrickson). He is the author of more than 160 technical publications and more than 100 invited talks and seminars. He is a recipient of an Alfred P. Sloan Fellowship, a National Science Foundation’s CAREER award, the American Physical Society’s Dillon Medal award (2009), a National Academy of Sciences Kavli Fellow (2009), was elected a fellow of American Physical Society (2013) and the American Association for the Advancement of Science (2018). He has held the position of honorary visiting professor at the Indian Institute of Science, Bangalore (2008).