Abstract: Metallic surfaces can be altered to achieve design objectives, e.g., corrosion resistance, wear or abrasion resistance, etc., using a wide range of coating methods. The particular method chosen is usually the result of the interplay of many factors including economics and design requirements. The focus of this talk will be on the development of coatings using Halide Activated Pack Cementation (HAPC). HAPC is a versatile and economical approach to apply coatings of desired compositions to a range of substrates, typically nickel and iron-based alloys. The coating process can be controlled to obtain the desired final composition and microstructure. The in situ generation of halide vapor species inside the pack with subsequent transport, surface reactions and solid state diffusion are important phenomena that need to be understood in order to achieve optimal coating conditions. In this talk, the halide-activated pack cementation process will be reviewed; relevant thermodynamics and kinetics will be discussed, and the current status of our work will be presented. Specific examples, e.g. diffusion coatings on nickel, steels and super hard coatings, will be discussed.

Biosketch: Dr. Vilupanur A. Ravi is Professor and Chair, Department of Chemical and Materials Engineering Department, Cal Poly Pomona. Prior to joining Cal Poly Pomona, he worked in industry. At Lanxide Corporation he worked on processing, development and application of advanced ceramic and metal matrix composites, and high temperature coatings. This work resulted in several US and international patents. Subsequently, he worked at W. L. Gore and Associates, Inc., where his technical contributions and leadership led to process improvements and enhanced product performance of expanded poly(tetrafluoroethylene) and derivative products. Dr. Ravi’s current research interests are in the areas of high temperature materials and coatings, and biomaterials. He serves on the Board of Trustees for ASM International. He is a key reader for Metallurgical and Materials Transactions, and serves as American Editor for Materials at High Temperatures. He has served as Chair of the Action in Education Committee of ASM International and President of Alpha Sigma Mu, the international professional honor society for materials Science and engineering. Dr. Ravi received his PhD in Metallurgical Engineering from the Ohio State University. He is a Fellow of ASM International, Alpha Sigma Mu and the Institute of Materials, Minerals and Mining (UK). He is a registered Professional Engineer (PE) in California, a Chartered Engineer (CEng) in the UK and a European Engineer (Eur Ing).