Plasma coatings were applied to ion vapor deposited aluminum coated steel. The coatings were evaluated for the protection against hydrogen re-embrittlement in various embrittling fluids and were found to effectively protect against hydrogen re-embrittlement. Next a hybrid IVD/plasma coater was designed and constructed and aluminum IVD coatings and plasma coatings of trimethylsilane (TMS) were successfully produced. Corrosion property evaluation using potentiodynamic polarization and 504 hour SO$_2$ salt spray test showed plasma coatings effectively protected against corrosion. Plasma coating in a hybrid reactor may save money and is an environmentally friendly and alternative to carcinogenic chromate conversion coatings.

A direct current atmospheric plasma brush was designed and constructed for sterilization of oral bacteria seeded on dentin and the enamel analogue hydroxyapatite (HA). When concentrations were less than $\sim 1.7 \times 10^7$ cfu/cm$^2$, full sterilization was achieved on HA. Sterilization was less effective when there was layering of cells. Full sterilization was not achieved on dentin due to bacteria penetration into dentin tubules. Further examination of the plasma treatment effect on bacteria seeded on the walls of a microchannel showed a line-of-sight killing effect. Plasma sterilization in an oxygen depleted container had no effect on sterilization rate. These data support a charged species mechanism as a major cause of cell death in contrast to the widely held claim of reactive oxygen species being the major cause.