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Direct injection of liquids into low pressure plasmas[1] MATTHEW GOECKNER, DAISUKE OGAWA, UT Dallas, RICHARD TIMMONS, UT Arlington, LAWRENCE OVERZET, UT Dallas, SAM SANCHEZ, UT Arlington — Being forced to use only gaseous precursors in plasma processing reactors is a significant and irrational limitation. Only a small minority of the molecules that could prove useful can be put into the vapor phase. On the other hand, a much greater fraction can be put into solution. We have found that by using a simple fuel injector directly coupled to a heated reactor, one can inject a variety of liquids directly into the plasma environment. A temperature controlled capillary tube can be used to accomplish the same thing. The liquids can also have a variety of solids dispersed in them: metals, dielectrics, aromatics, proteins, viruses, etc. While we have not had time yet to do detailed studies on a very wide range of liquids and dispersed solids, we do have the proof of principle. We have made films from injecting 1] ethanol, 2] hexane 3] iron nanoparticles dispersed in hexane and 4] ferrocene dissolved in benzene into capacitively coupled plasmas at approximately 50 mTorr. The details of the reactor and the films produced to date will be explained in the poster. Briefly: we use capacitively coupled plasma sources. Typical pressures are well below 1 Torr and powers below 10 Watts. The hexane films have growth rates around 10 nm/min.

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