Plasma polymerization is a new kind of material preparation process. The materials formed by plasma polymerization are vastly different from conventional polymers and they constitute a new kind of material. Plasma polymerization has been dealt with, however, as an extension of polymerization from the academic viewpoint and as a new technology to prepare thin films from a practical viewpoint. Plasma polymerization refers to the formation of polymeric materials under the influence of plasma (partially ionized gas). The most practical means of carrying out plasma polymerization involves the use of an electric glow discharge in a vacuum, therefore the term glow discharge polymerization has been used, synonymously with plasma polymerization.

Recently the technique of plasma polymerization is used increasingly as an efficient means for obtaining entirely new class of polymer based materials with a wide range of optical and electrical properties. This class of materials will have wide range of applications in capacitors, rechargeable batteries and devices for energy conversions. Correlation of the various properties namely structural, optical and electrical, with the composition of the polymer is highly essential for tailor making these materials for various applications.
The present thesis reports electrical and optical properties of plasma polymerized Furan and Lemon grass oil thin films. Here we have used Radio frequency plasma discharge as the mechanism for producing plasma polymerized thin films. The results of the present investigation will be discussed in the thesis. The thesis will consist of ten chapters. As introductory part, the first chapter of the thesis gives a brief sketch of the earlier work done in the field of plasma polymerization, different methods used for production of films and important results in the characterisation study of typical films are highlighted. The scope of present investigation is also pointed out.

In the second chapter, the theory relevant to the problem is developed. This chapter also includes the discussion about different possible conduction mechanism in thin films.

In chapter three the various experimental techniques and the procedures employed in the present investigation for the preparation and characterization of plasma polymerized films are presented.

In chapter four spectroscopic characterization of plasma polymerized Furan and Lemon grass oil thin films are given. For the structural studies we have used IR spectroscopy and tentative structures of the polymer and probable mechanism of polymerization are given. Refractive index, extinction co-efficient, and band gap energy of these films are discussed in this chapter, using UV-VIS-NIR spectroscopy as our experimental tool.
In chapter five and seven electrical properties of the plasma polymerized Furan and Lemon grass oil films are discussed. The possible conduction mechanisms in these films are also discussed.

In chapter six and eight the dielectric properties of these films are studied. We have studied the dielectric properties of these films at different ranges of the frequencies and at different temperatures.

In chapter nine the results of studies on the optical and electrical properties of these polymerized films and films doped with iodine are given.

Chapter ten is the concluding section giving a brief account of the experimental results which highlight the importance of the work and future scope.

Papers published / communicated / presented in symposium.


3. Structure and effect of pyrolysis on plasma polymerized polyfuran thin films (communicated)

4. On the mechanism of electrical conduction in plasma polymerized Furan films (communicated)

5. Dielectric properties of plasma polymerized Furan films (communicated)
6. Mechanism of electrical conduction in plasma polymerized Lemon grass oil thin films (communicated)

7. Dielectric properties of plasma polymerized Lemon grass oil thin films (communicated)

8. Effect of Iodine doping in electrical and optical properties of the plasma polymerized Furan and Lemon grass oil thin films (communicated)