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High Frequency Plasma Polymerisation of Pyridine

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Abstract: ***The present article reports preparation of thin organic polymer films at high frequency by plasma polymerization technique taking Pyridine as starting monomer. Structural analysis of film by IR Spectra was performed which revealed C-H chains linked to other aromatic rings in the polymer structure.***
Keywords: Polymerization, Monomer, Cross-linking, IR Spectrum, high frequency etc.

I. INTRODUCTION

Plasma Polymerization technique is the recent and a superior technique for the synthesis of organic as well as inorganic polymer films [1]. Considerable attention has been given to the study of plasma polymerized organic compounds which are found to possess cross linked structures and are well suited for electrical insulation[2].The I.R. spectra of Benzene reveals formation of branched polymer chains after fragmentation of aromatic rings in the plasma atmosphere[3].

II. EXPERIMENTAL DETAIL

The entire experimental set up is shown in Fig.(1) The polymerization was performed in capacitively coupled glow discharge using parallel plate electrodes system. The Aluminium electrodes of 7cms diameter were kept apart by 1.5 cms. The monomer (Pyridine), taken in a crucible, was allowed to be polymerised by evaporating it into the chamber itself. The polymer was deposited at aluminium foil wrapped uniformly over the electrodes. These films have been prepared at a frequency of 50 Khz, applied at the electrodes using wide band high voltage amplifier (EA-WB-100). The deposited films were then taken out from aluminium electrodes by dipping into the water. The films so recovered then mounted on slide for IR Spectrum analysis with the help of Perkin Elmer 883 I.R. Spectroscopy system.

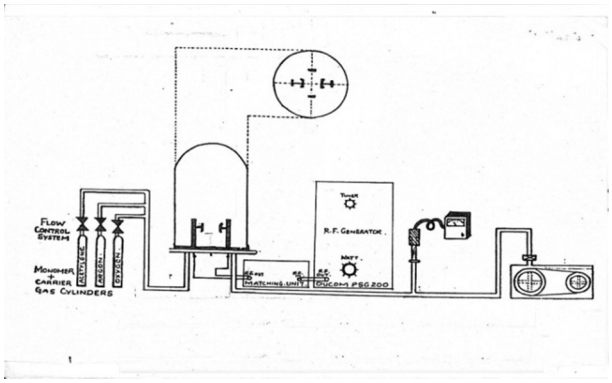


Fig.(1) Experimental Set-Up for Plasma Polymerisation

III.I.R. ANALYSIS

The I.R. spectrum of the polymer recorded as shown in Fig. (2). The spectra reveals a most predominant vibration in the frequency range from 1660 to 1660 cm^{-1} which attributed to C=C/C=N ring stretching vibration in cyclic conjugated system [4] . There also exists absorption at 220 cm^{-1} which is possibly due to C-N stretching vibrations. However other absorption indicates probable existence of Methyl or Methylene groupings. Thus it seem that C-H chains, possibly including Nitrogen atoms, are linked to other aromatic rings in the polymer structure.

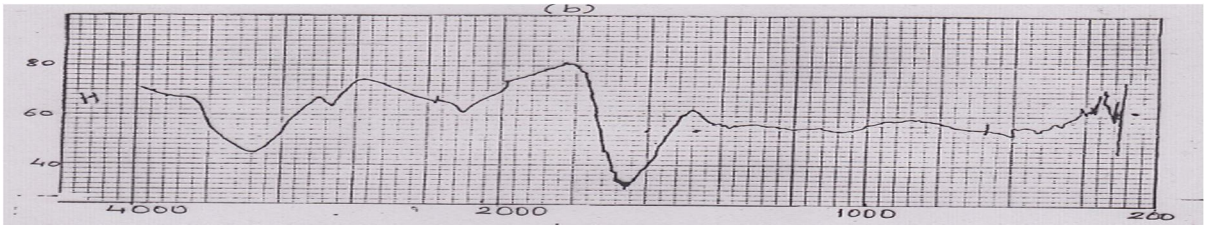


Fig..(2) IR Spectra of PolyPyridine prepared through Plasma Polymerization at 50 Hz.

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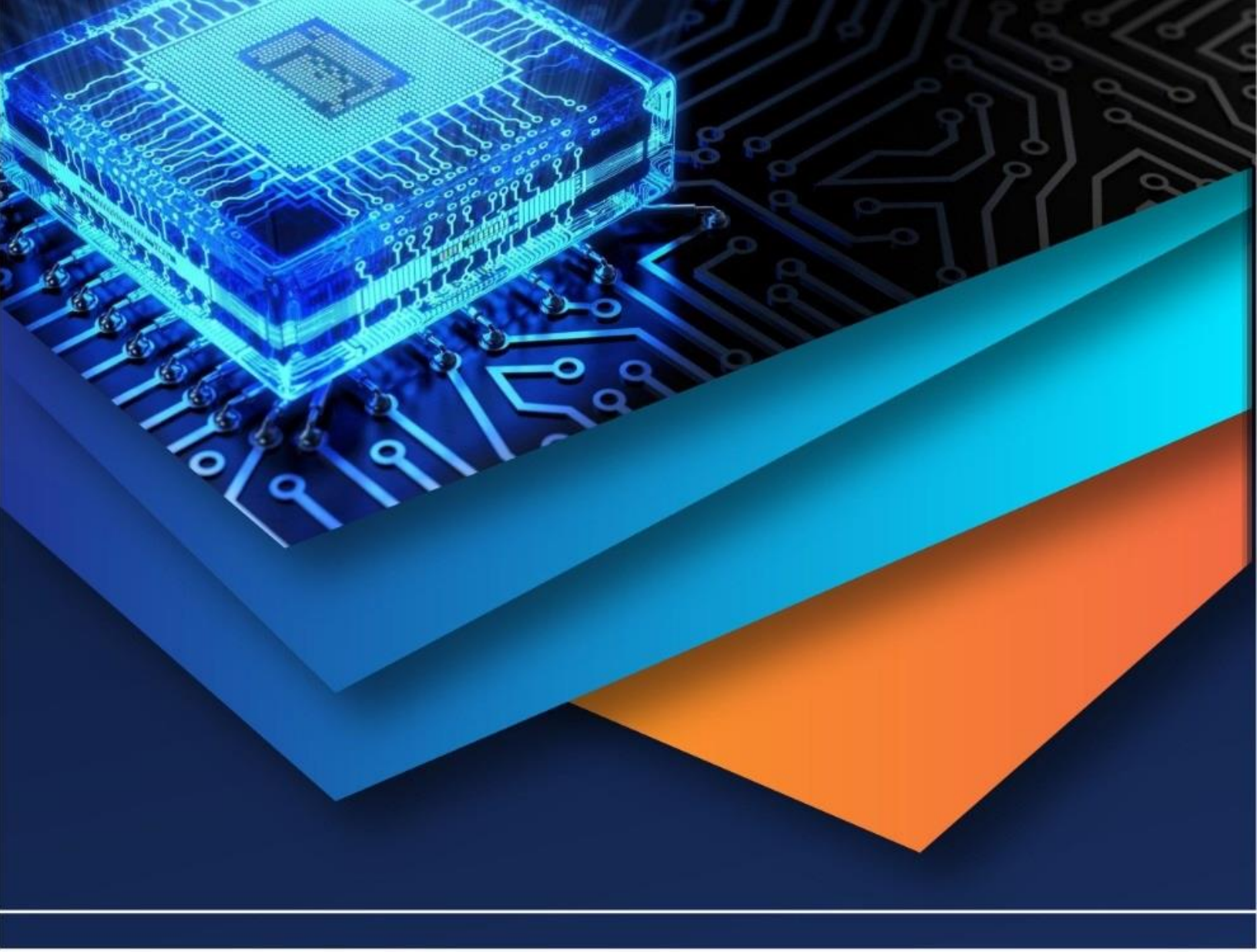
IV. CONCLUSION

The plasma polymerisation of Pyridine was performed in plasma atmosphere by direct evaporation into discharge. The film obtained was found insulating in nature The film revealed hazy brown color with thickness of the order of 8.0 µm .The film obtained was observed consisting of C-H chains linked to aromatic rings with Nitrogen atoms. The structure reveals amorphous in nature.

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