

1. INTRODUCTION

Plasma focus is a pulse plasma device, capable of generating fusion neutrons, charged particle beams, hard and soft x-ray radiation. Recently, there is an increasing effort in x-ray study with aim in lithography application, due to plasma focus simplicity, efficiency and high radiation intensity in comparison with other sources, such as gas-jet Z pinch; conventional x-ray tube. Many authors have investigated soft x-ray emission from small to large plasma focuses. Hirano et.al.[1] have studied the x-ray emission from a 65kV 9kJ plasma focus operating in pure deuterium. Soft x-rays were found to be emitted within a time span of ~ 50 ns. in a characteristic series of successive peaks, corresponding to the maximum compression, the disruption and the decay of the plasma column. Addition of argon on other rare gases to hydrogen leads to higher x-ray emission from plasma focus. Time resolved x-ray photography of 20 kJ plasma focus operating in ~ 1 torr of hydrogen(+10% argon) has been earlier reported by Burnett et.al.[2]. Choi et.al.[3] have correlated the hard and soft x-ray emission with the relativistic electron beam in 60kV 28kJ plasma focus with hydrogen +3% argon gases. Enhancement of soft x-ray emission by mixing noble gases to hydrogen in plasma focus has been reported by Kato and Bel[4]. For argon-hydrogen plasma, the best volumetric ratio is 40:60. Recently, Favre et.al.[5] reported soft-x-ray emission in a small 3kJ plasma focus operating with H_2 -Ar mixtures, using a BPX65 pin diode multichannel spectrometer looking both axially and radially into plasma focus region. Two main periods are observed in the x-ray emission, corresponding to two successive compressions in the focus. The first peak corresponds to the first maximum compression (as indicated by large dI/dt signal), while the second peak results from the electron beam-anode interaction.

In this study, soft x-ray emission from a small 3kJ plasma focus in various pure gases:deuterium, nitrogen, and argon are reported.