

# Development of 3.3 kJ Small Plasma Focus for Medical Radioisotopes Production: Preliminary results

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PET scan is a medical imaging device for effective cancer diagnosis. It use medical radioisotopes such as 18-F. Since 18-F has short half-life, on site production is inevitable. Normally, cyclotron is used in the big hospital to produce 18-F. Plasma focus, a much cheaper and compact system, is an alternative device for 18-F production. The plasma focus can generate energetic particles which have enough energy for nuclear reaction to generate radio-isotopes. The main part of plasma focus device is consist of vacuum chamber, coaxial electrode, high voltage capacitor, high voltage power supply, spark gap and trigger. The Lee model and current waveform of RLC circuit is used to design the 3.3 kJ plasma focus. The cathode and anode radius are optimized to be 1.25 and 2.50 cm, respectively, where their length are the same as 22.50 cm. The model show that when maximum current of 167 kA is pinched within 13.4 ns, plasma temperature is risen to be  $4.08 \times 10^6$ K. To verify the Lee model, electric current oscillation in RLC circuit is measured under short circuit, when inductance L, resistor R and capacitor C are 125 nH, 20 m $\Omega$  and 30  $\mu$ F, respectively.

## Summary

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