# Design of a microwave-induced microplasma source based on microstrip resonant array structure

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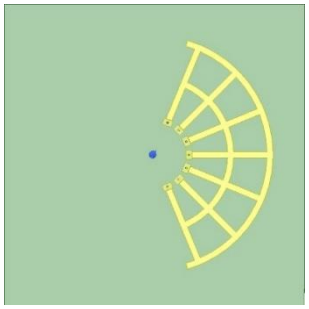
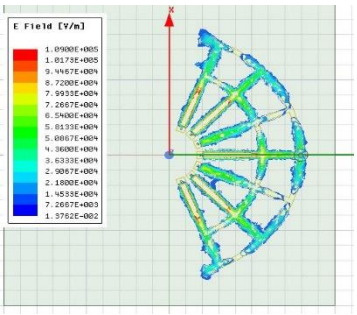
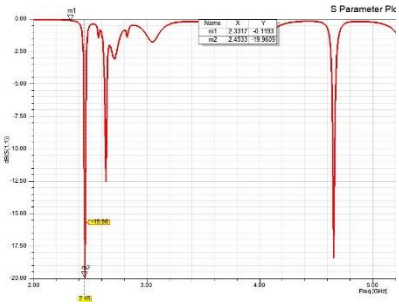


Microplasma sources show the merits of high plasma density, good stability, low cost and ease to be integrated. Their applications have been found in many fields such as bio-microelectromechanical system sterilization, small-scale materials processing, and microchemical analysis systems. Comparing to the plasmas triggered by lower frequency powers, microwave plasma has been reported to own the advantages of no electrode, wider operating pressure, lower energy consumption, higher efficiency and more active species. Therefore, microwave-induced microplasma seems to have promising potential.

This paper, in view of this, propose a microwave-induced atmosphere pressure microplasma source at frequency 2.45GHz based on microstrip resonant array structure. A gap with the width of 0.1mm is set at the end of each resonant element to obtain a strong electric field indensity there. A single feed structure is used to provide power to all the elements. To make sure that each element could get the same amount of power, a coupling ring is employed in the design. The simulation results show that, when the microwave input power is only 1W, the electric field indensity at the gap can reaches $10^5$ v/m, which empowers this source the potential of plasma generation with low input power.




This microplasm source made using F4B as a substrate material. Experimental consequences are basically consistent to the simulation. The plasma generation is shown in the following figures when the input power is 30w. However, the experimental result is not as good as expected by the simulation. The current device also has the problem of the resonance point offset and six units cannot be excited at the same time. Further optimization improvements are needed.