

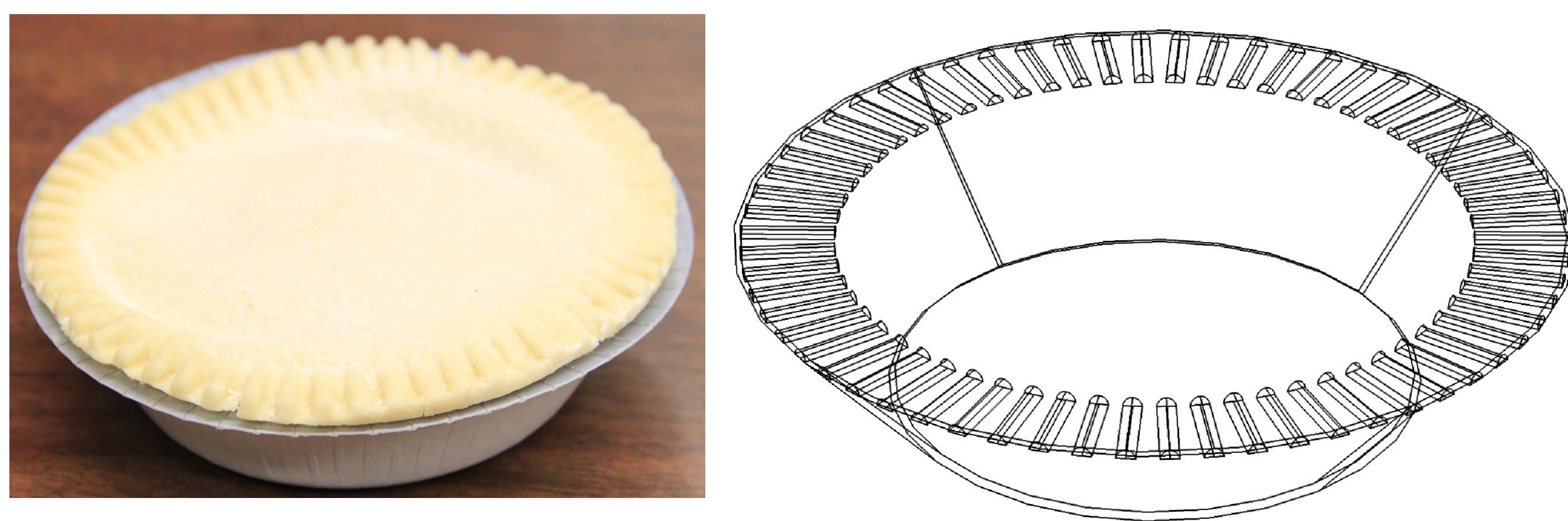
# Microwave Heating Simulation of Frozen Pie

Fangyuan Chen<sup>2</sup>, Tushar Gulati<sup>1</sup>, Ashim Datta<sup>1</sup>

1. Cornell University, Biological and Environmental Engineering, Ithaca, NY, USA, 14850

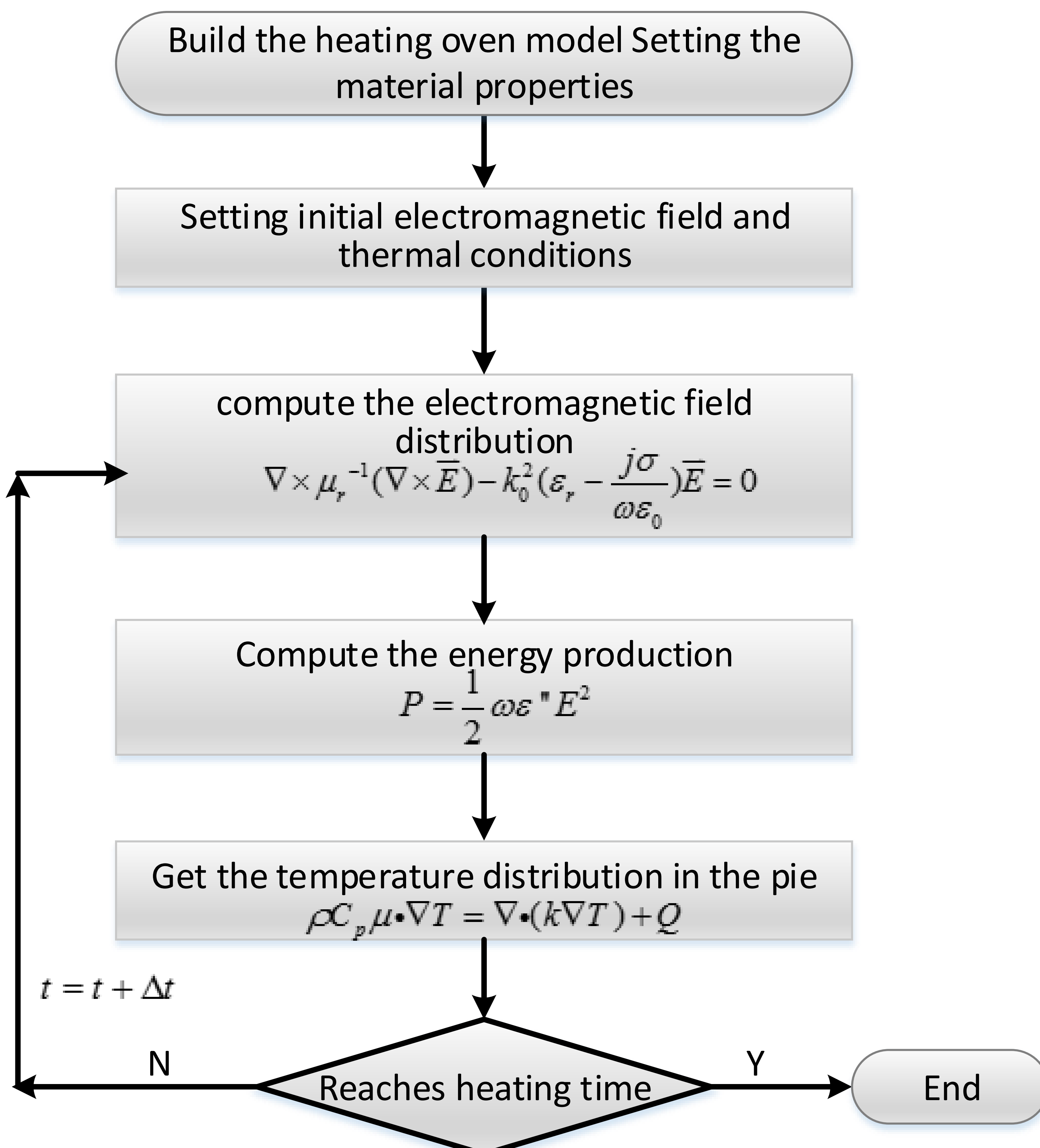
2. Sichuan University, Institute of Applied Electromagnetics, Chengdu, Sichuan, China, 61000

**Introduction:** This research studies the thermal effect of frozen pie heating in the microwave oven. Considering as composite material, the properties of pie derived based on its composition. Here the package, susceptor's influence to the temperature distribution is also studied.



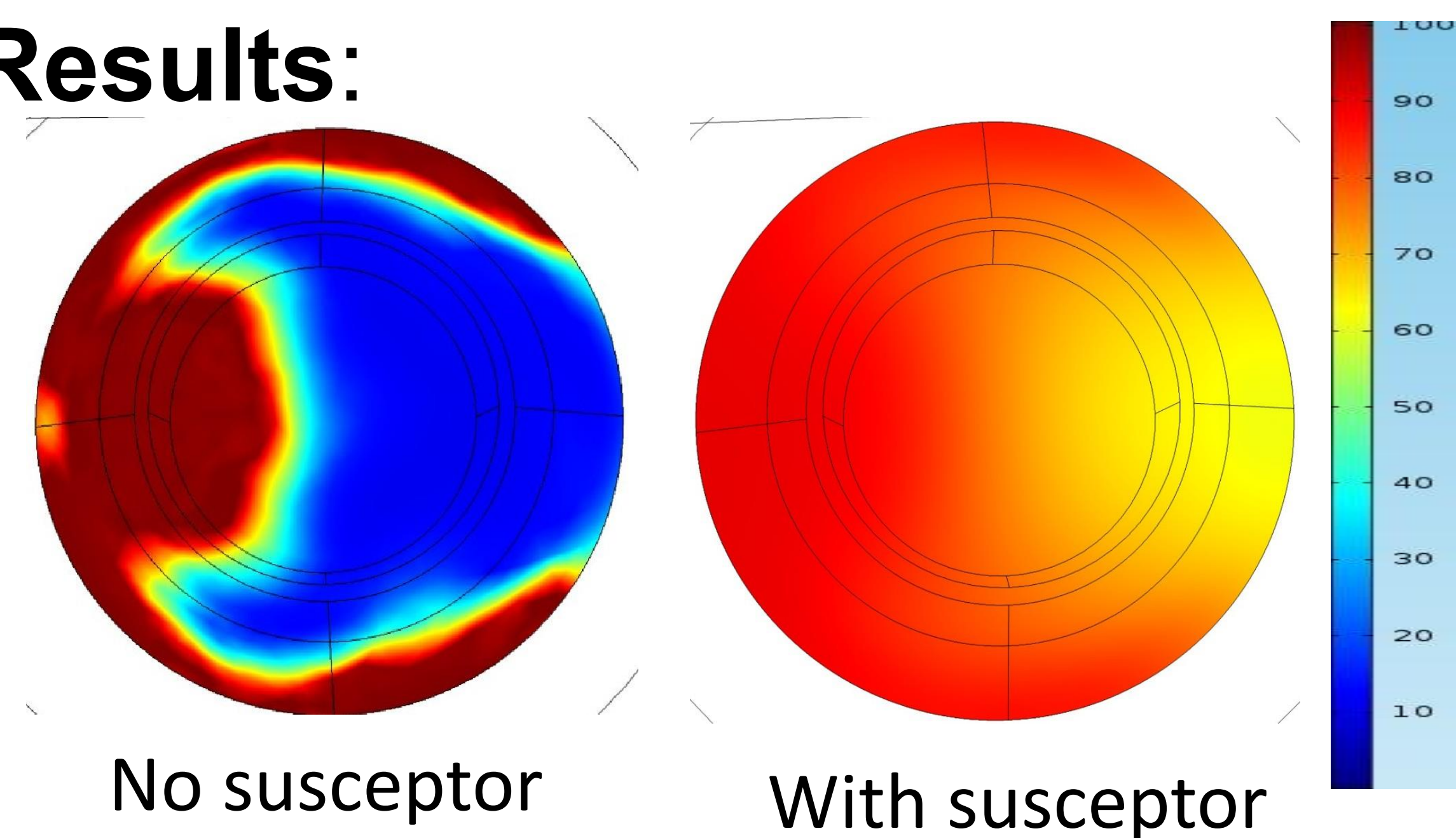
The heated pie in the study

**Computational Methods:** Here electromagnetic field and thermal field coupled in this research. The computation work finished with Finite Element Method in COMSOL4.4. These two field equations represent as:

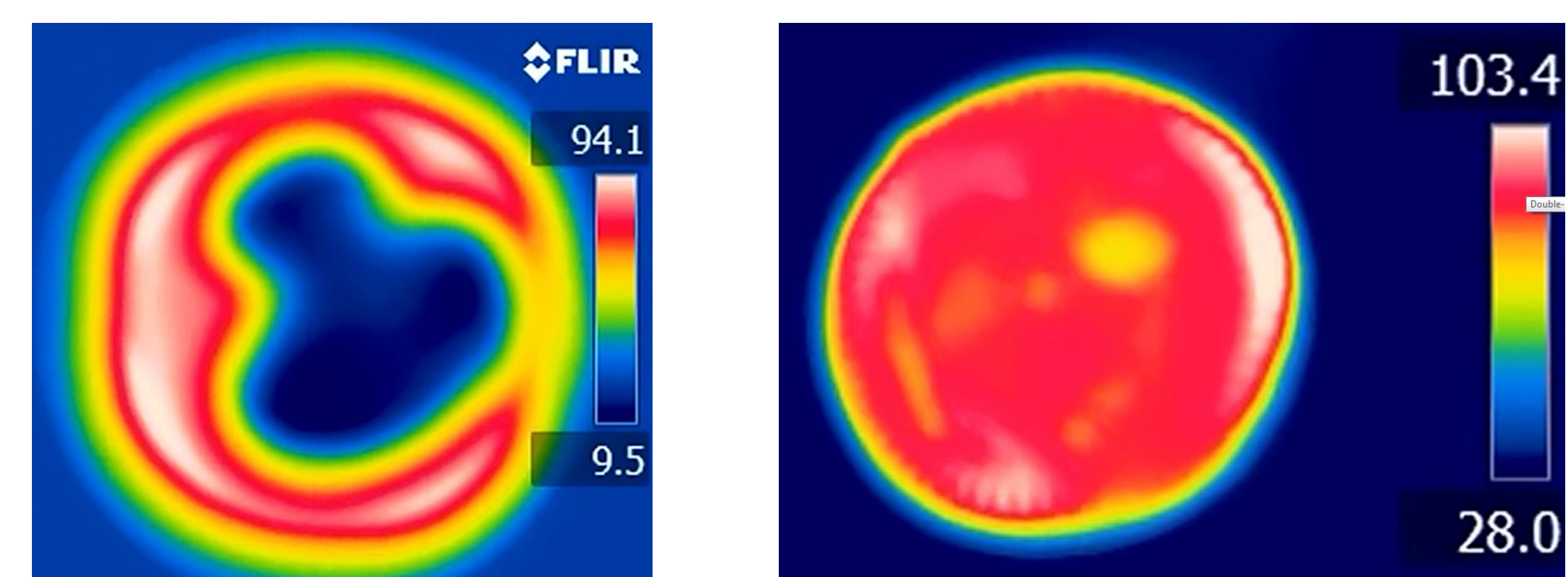


Computation Flow Chart

## Results:

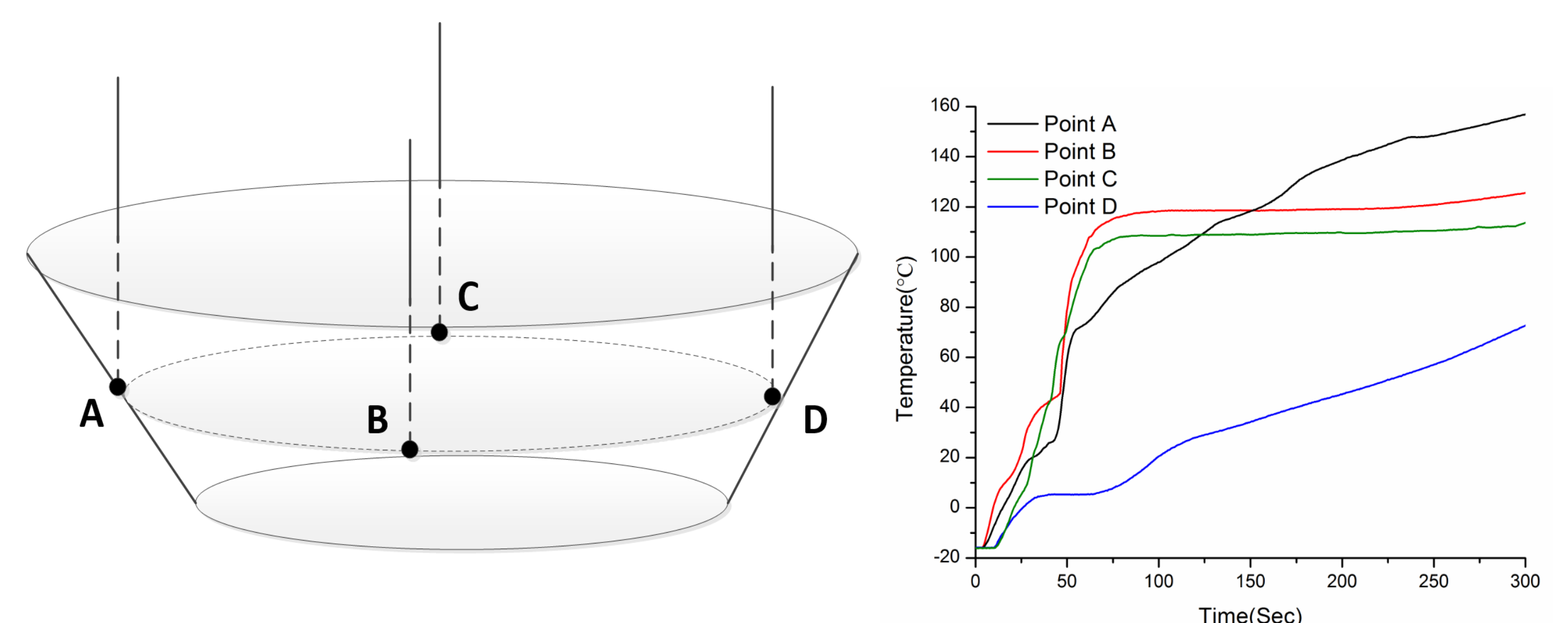


Simulated



Measured by Infrared camera

Temperature profile after 300s



Point temperature rising of four points in the pie

**Conclusions:** A new approach to simulate the thin susceptor in the microwave heating was employed in this study. The experiment final temperature and temperature change matched well with the simulated. With the susceptor, temperature distribution is more even and the surface of pie is more crispy.

## References:

1. Tushar Gulati, Ashim K. Datta, Enabling computer-aided food process engineering: Property estimation equations for transport phenomena-based models, *Journal of Food Engineering* 116 (2013) 483–504.
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3. Matthew W. Lorence, Peter S. Pesheck, *Development of packaging and products for use in microwave ovens*. Woodhead Publishing Limited, 2009.