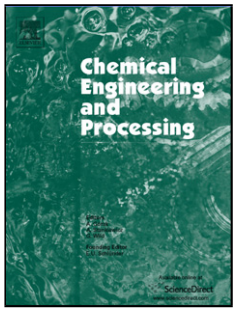

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Authors: C. Bianchi, P. Bonato, F. Dughiero, P. Canu

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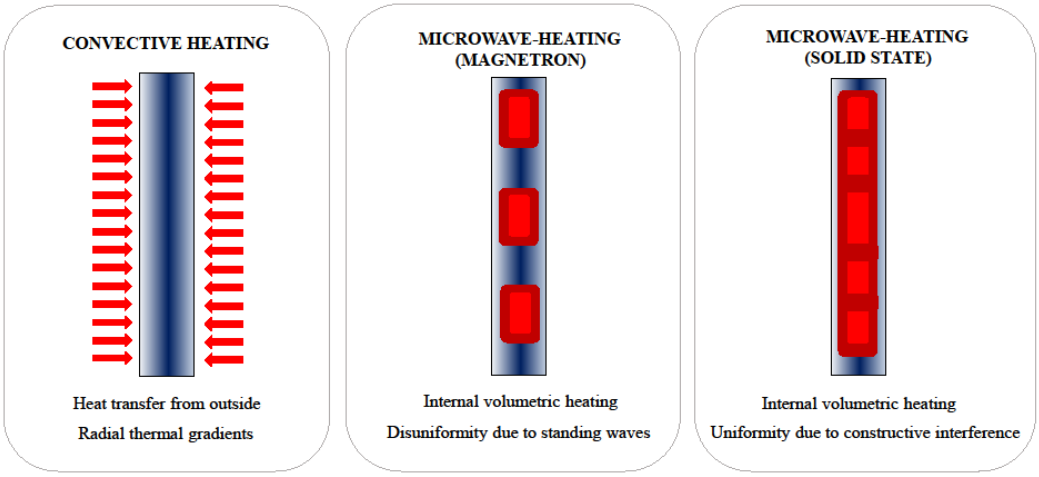
Enhanced power density uniformity for microwave catalytic reactions adopting solid-state generators: comparison with magnetron technology

C. Bianchi[(1)], [1] P. Bonato[(2)], F. Dughiero[(1)], P. Canu[(2)]

Department of Industrial Engineering, University of Padua, Via Gradenigo 6/a, 35131 Padova, Italy

[(1)]Electrical Engineering Division, [(2)]Chemical Engineering Division

Graphical abstract



Highlights

- Volumetric heating reduces thermal gradients along normal vectors to the load surface
- For microwave tubular systems the reduction of axial gradients is still a challenge
- A magnetron based prototype has been developed to validate a Finite Element model
- Load granulometry affects strongly the electromagnetic power density distribution
- Solid state microwave sources yield more uniform power distributions than magnetrons

Abstract

Endothermic processes at high temperature are typically implemented through heat transfer techniques based on thermal conduction from the surface. This situation implies non-uniform radial temperature within the load causing a lower quality process. The microwave (MW) based volumetric heating is the ideal alternative to improve these processes, but axial-thermal gradients appear for the presence of resonant standing waves. In the current research, a laboratory-prototype has been developed to experimentally validate an implemented Finite Element (FE) model. The efficiency and the non-

[1] Corresponding author: christian.bianchi.1@phd.unipd.it, University of Padua, Via Gradenigo 6A, Padova, (PD), Italy, ZIP 35131