# Development of Catalyst Materials Enabling Induction Heating for Emission Control Applications

A. Asadli[1], C. Schmitt[1], S. Behrens[1], S. Gross[2], M. Wolf[1,3]

[1]Institute of Catalysis Research and Technology, Karlsruhe Institute of Technology (KIT), 76344 Eggenstein-Leopoldshafen, Germany
[2]Department of Chemical Sciences, University of Padova, 35131 Padova, Italy
[3]Engler-Bunte-Institut, Karlsruhe Institute of Technology (KIT), 76131 Karlsruhe, Germany

E-Mail presenting author: asad.asadli@kit.edu

Electromagnetic induction heating appears to be a promising candidate for achieving controlled, dynamic, and immediate heat regulation, which could help to accommodate spontaneous emissions [1]. This technology has a huge potential to drive the electrification of industrial processes by implementing adaptive catalytic systems to fluctuating renewable energy supply [2]. Heating the bulk reaction medium through reactor walls is fairly slow and results in temperature gradients. In induction heating, heat is generated locally at the susceptor material when exposed to an alternating magnetic field. Magnetic heating efficiency is a key factor in selecting the susceptor. The specific absorption rate (SAR), describes the efficiency of the energy conversion into heat and is dependent on magnetic and material properties, such as the size or shape of the selected susceptor [3]. Therefore, material synthesis and development are vital steps in the improvement of this concept.

Herein, iron-based materials (magnetite, nickel and cobalt ferrites) were produced via coprecipitation, hydrothermal, and surfactant-free benzyl alcohol routes [4]. Alternatively, noble metal (Pt, Pd) supported alumina catalysts were decorated with iron carbide nanoparticles or modified with magnetite nanoparticles. Prepared materials were characterized, the magnetic efficiencies were tested via solvent-heating tests and compared to commercially available bulk susceptors.

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