

Literature Review: What is the Current State of the Art in Electric Heating for Thermal Process Technology?

What is it about?

Energy-intensive thermal processes (e.g., heating, preheating, annealing) can be electrified to reduce the use of fossil fuels. To transfer electricity "from the outlet" to the material being heated (e.g., strips or billets) in the form of heat, technologies classified under the term *electric heating* are used. This includes any method that uses electricity to generate heat for thermal processes. Prominent examples are electric arc furnaces and resistive heating elements, the latter being familiar from household appliances like toasters.

In recent years, resistive heating elements have seen a renaissance. A comprehensive overview of the current state of the art and identification of critical technological hurdles is needed. The last regular and significant research contributions in this field date back 40–50 years.

Your task is to conduct an in-depth literature review on resistive heating elements, with a special focus on high-performance resistive heating elements. These have the potential to electrify energy-intensive thermal processes and replace fossil-fuelled burners. The research findings should be analysed to identify connections, trends, and potentials.

Your work may also be published in professional journals, contributing to raising awareness in the technical community about the potential of resistive heating elements.

Given the potentially large scope of the project, smaller contributions are also welcome. If you are interested, feel free to reach out to discuss your ideas. The topic of your thesis can be tailored accordingly, whether it's a project assignment, bachelor's thesis, or master's thesis.

Time for orientation and familiarization with the topic will be provided if needed.

After successfully completing your thesis, there may be an opportunity to continue working as a research assistant (HiWi).

Your Profile:

- Independent working style
- Interest in computer-based research
- Interest in reading and understanding scientific articles
- Interest in climate-friendly technologies

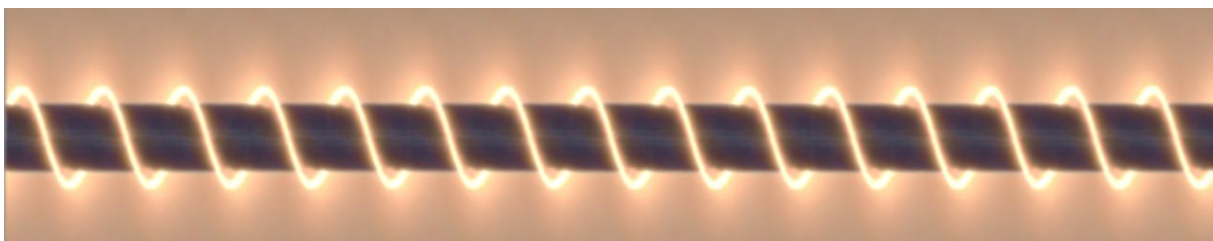


Figure 1: Glowing heating wire spirally wound on a ceramic rod

Questions and further information:

Julius Wilker, M.Sc.
Institut für Industriefenbau und Wärmetechnik
Gruppe: Industriefentechnik
Raum 01-208
Tel: +49 241 / 80 25965
E-Mail: wilker@iob.rwth-aachen.de