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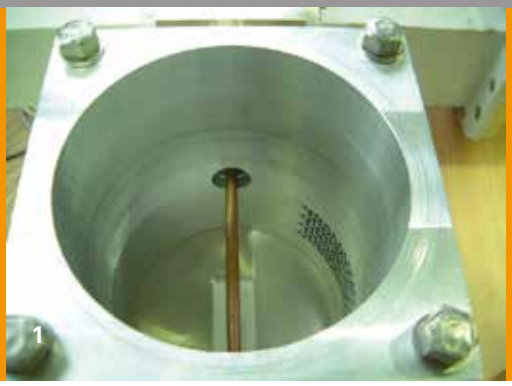

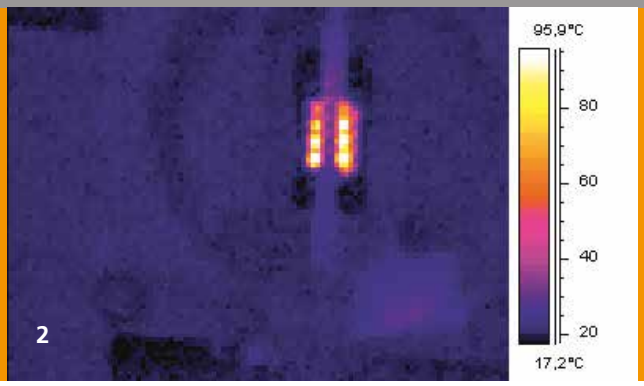

1 *Pressureless microwave cavity with coaxial antenna system.*
2 *Thermogram of a microwave-heated energetic sample.*

ENERGETIC MATERIALS IN MICROWAVE FIELDS

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Where energetic materials are ignited by microwaves, initiation generally occurs in the entire volume of a propellant charge, or the ignition spreads from absorber structures.

Advantages of introducing microwaves

Besides eliminating the need for pyrotechnic ignition elements, the introduction of microwaves ensures an improved, controllable ignition process. Specially prepared, high-density explosive powders, including powders with radiation-absorbing structures inside them or on their surfaces, are fragmented in a controlled process and ignited. It is also possible to influence the interior ballistics (pressure-time-process) using energy introduced by microwave radiation.

The aim is the development and investigation of the microwave ignition of propellant powders, in terms of their suitability for heating with electromagnetic radiation (using dielectric spectroscopy) and the targeted modification of materials for improved radiation absorption.

Equipment and measurement technology

- Thermography and high-speed kinematography
- Network analyser to determine the dielectric constants (polarisability, absorption capacity) under different experimental conditions and parameter variations
- The generation of microwave radiation with magnetrons at a frequency of 2.45 GHz and outputs of up to 30 kW (pulsed) or 6 kW (cw).

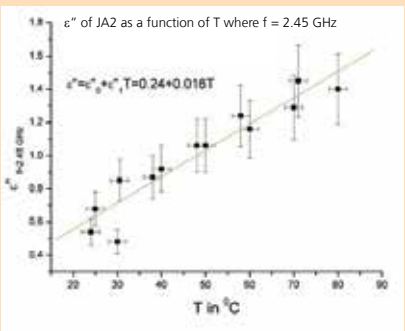
Examples of applications

- Temperature independence of the imaginary part of the dielectric constants of JA2
- 3D simulation of the heating of energetic material with absorber structure
- Differentiation of surface and volume heating of a JA2 sample with partial graphite film

Our offer

- Expertise and feasibility studies in heating and ignition of energetic materials
- Investigation of suitability for microwave absorption, by determining the dielectric constants as a function of frequency and temperature
- Integration and structuring of absorbers in energetic materials, thermography and high-speed kinematography in microwave fields both at atmospheric pressure and under high-pressure conditions

Temperature dependency of the imaginary part of the dielectric constant of JA2



3D simulation of the thermal current of an absorber structure in a microwave field