Ignition of a mechanically activated thermite mixture Al+CuO with spark overlap of the interelectrode gap

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The report presents experimental results of initiating chemical interaction between the components of a porous mixture of Al+CuO powders. The mixture consisted of either micron or nanoscale powders. Mixtures of all types of filling were mechanically activated in ball mills. When the charge was placed in the housing, the mixture had a tight contact with a flat dielectric base with two electrodes. The electrodes were mounted in parallel holes of the dielectric base flush with its surface. Copper, or aluminum, or magnesium, or tungsten wires with a diameter of 1-2 mm were used as electrodes. The dielectric gap between the electrodes did not exceed 2 mm. The energy of 1 mJ or more of an electric discharge between the ends of cylindrical electrodes stimulated the beginning of chemical interaction. The duration of the release of spark energy did not exceed 1 microsecond. The content of the work consisted in determining the minimum value of the discharge energy for ignition of the mixture. In addition, the influence of the initial parameters, the mixture of geometric and energy parameters of the discharge on the nature and stability of the combustion of the mixture was determined. For a mixture of nanoscale components, ignition initiation was detected under conditions of the pre-spark phase of the discharge.