

TRANSITION OF A GASLESS COMBUSTION WAVE THROUGH AN AIR GAP

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Critical conditions for the passage of a gasless combustion wave through inert metal barriers are discussed in the articles [1, 2]. The features of the propagation of a high-temperature synthesis wave through an air gap are examined experimentally and theoretically for Ni+Al and 5Ti+3Si systems of stoichiometric composition. Cylindrical samples made from a mixture of the same composition were used. The ignition delay time of the sample was determined depending on the width of the air gap. Critical values of the air gap width have been found at which the transition of a combustion wave from one sample to another is still possible. The proposed mathematical model makes it possible to calculate the effective emissivity from the end surface of a burning sample, consistent with experimental data. Radiative-conductive heat transfer on the end surfaces of samples separated by an air gap was considered. Conjugate boundary conditions and radiation were specified according to the Stefan-Boltzmann's law. Video frames of the combustion wave transition from one sample to another for the Ti-Si system are shown in the figure 1.

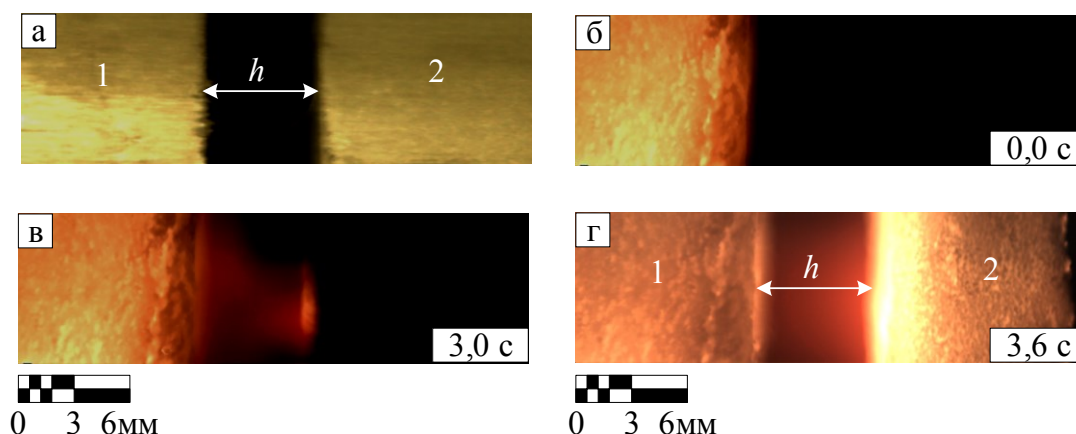


Fig.1. Video frames: (a) – original samples 1 и 2; (б, в, г) – video footage of a combustion wave passing through an air gap.

REFERENCES

- [1] R. M. Gabbasov, V. D. Kitler, V. G. Prokof'ev, A. M. Shul'pekoy, "Layered NiAl/Cu/NiAl Composite by SHS in a Mode of Frontal Combustion," *International Journal of Self-Propagating High-Temperature Synthesis*, vol. 29, no. 2, pp. 104–107, 2020, doi: 10.3103/S1061386220020053.
- [2] R. M. Gabbasov, V. D. Kitler, V. G. Prokof'ev, A. M. Shul'pekoy, "Passage of a Gasless Combustion Wave through a Perforated Barrier," *Combustion Explosion and Shock Waves*, vol. 58, no. 6, pp. 657–664, 2022, doi: 10.1134/S001050822206003X.