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**Advanced Diagnostic Techniques for Experimental Study  
of the Self-propagating High-temperature Synthesis (SHS)**

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**ABSTRACT**

Self-propagating high temperature synthesis (SHS) is a promising method for the synthesis of a wide variety of advanced materials in the combustion mode. Therefore, fundamental and applied study of this process must include not only common characteristics of combustion (such as propagating velocity, temperature profiles etc.), but also main features of the product structure formation. In the present work, both traditional and novel methods of experimental diagnostics of the SHS processes are considered. Methods of image recording traditionally play important role in the combustion science. Modern problems of these methods, from the photography to high-speed digital video recording, are discussed. Various methods for temperature profile measurement (micro-thermocouples, micro-pyrometry) are examined from the viewpoint of withdrawing kinetic information from the profile. Quenching of the SHS wave provides unique possibility to obtain data concerning dynamic of microstructure formation of the products. A novel powerful method for *in situ* study of the crystal structure evolution, time resolved X-ray diffraction (TRXRD) is considered.