The optical analysis in the infrared and visible spectrum of explosive and large-scale gas droplet emissions of fine fuels into the atmosphere by three-channel optocouplers

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A high-speed three-channel analyzer of optically dense aerosol flows of explosive and flammable liquid hydrocarbons based on three synchronized diode optocouplers made of heterogeneous nanostructures of semiconductor materials with an electromagnetic radiation wavelength of $\lambda = 0.65, 3.4$ and 3.8 microns, with a response time of $\tau \leq 0.05$ s and transmission of digitized data via the RS–485 interface to a secure server remote up to 1200 m has been developed and patented. Its design and characteristics are described when detecting gas-droplet fuel flows at a speed of up to several hundred meters per second in the atmosphere, with an optical density of up to 3.5, with a particle diameter from 0.1 to 5000 microns and a mass concentration of droplets and vapors in the range of lower and upper limits of ignition of fuel-air mixtures (FA).

The possibility of integrating the created high-speed optocoupler network with industrial safety control systems of fuel and energy complex facilities, as well as their use for engineering calculations of flooded gas-drop jets and analysis of the evolution of emergency emissions of liquid fuels is shown.

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