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Extrudable Gassy Pyrotechnic Time Delay Compositions

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Abstract: A copolymer of chlorotrifluoroethylene and vinylidene fluoride was investigated to assess its viability as an oxidiser, for aluminium as the fuel, in an extrudable pyrotechnic composition for application in 3D printing. Experimental results and EKVI thermochemical modelling suggested that a fuel loading of 30 wt.% would provide the maximum energy output. DTA and TGA analysis were performed in order to ascertain processing limits. With the addition of a processing aid LFC-1[®] samples could be extruded successfully. Printing with the compositions had limited success. The high melt viscosity paired with the filament's susceptibility to excessive preheating caused the print quality to be low. Delamination did not occur due to good fusion achieved during layer deposition. With minor compositional adjustments printing quality could be improved.

Keywords: polymer, burning rate, pyrotechnic, ignition time

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