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Experimental study of combustion of decane, dodecane and hexadecane with polymeric and nano-particle additives MOHSEN GHAMARI, ALBERT RATNER, University of Iowa — Recent studies have shown that adding combustible nano-particles could have promising effects on increasing burning rate of liquid fuels. Combustible nano-particles could enhance the heat conduction and mixing within the droplet. Polymers have also higher burning rate than regular hydrocarbon fuels because of having the flame closer to the droplet surface. Therefore adding polymeric additive could have the potential to increase the burning rate. In this study, combustion of stationary fuel droplets of n-Decane, n-Dodecane and n-Hexadecane doped with different percentages of a long chain polymer and also a very fine nano carbon was examined and compared with the pure hydrocarbon behavior. In contrast with hydrocarbon droplets with no polymer addition, several zones of combustion including a slow and steady burning zone, a strong swelling zone and a final fast and fairly steady combustion zone were also detected. In addition, increasing polymer percentage resulted in a more extended swelling zone and shorter slow burning zone in addition to a shorter total burning time. Addition of nano-particles also resulted in an overall increased burning rate and shortened burning time which is due to enhanced heat conduction within the droplet.

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