Unique Aerodynamically Driven Methodology for Forming Droplets, Threads to Scaffolds

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This unique and versatile jetting technology is driven by a pressure difference over an orifice and possesses the ability to form droplets, threads to scaffolds. The new approach competes successfully with its rival technologies such as ink-jet printing, which operates only in the micrometer remit, and electrospraying, which involves some hazards for the operator.

The aerodynamically assisted setting device has a chamber with an internal height and diameter of 16.2 and 8.2 mm, respectively, made of stainless steel. The needle has an internal orifice diameter of 0.35 mm. When the needle is in place, the exit orifice is ~0.2 mm below the jetting needle. The exit orifice is countersunk externally and has a similar diameter to that of the internal orifice of the needle. Another input exists that is placed on the side of the chamber, which supports the flow of the regulated pressure into the chamber giving rise to the pressure difference over the exit orifice assisting in the formation of a jet. The needle accommodating the flow of media into the chamber has a syringe connected to it via silicone tubing to a hypodermic needle. The syringe is placed on a precision syringe pump. The compressed air into the chamber is digitally regulated by means of a precision pressure regulator (Fig.1).

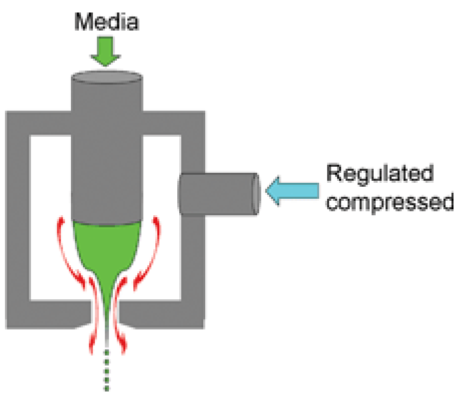

Fig.1 Aerodynamically assisted jetting device

At very low flow rates and a correspondingly low applied pressure jetting does not take place. The pressure instead gives rise to the formation of bubbles in the silicone tube holding the flow of polydimethylsiloxane media resulting in ***back flow***. Forming the finest possible droplets is possible by ***increasing the flow rate***.

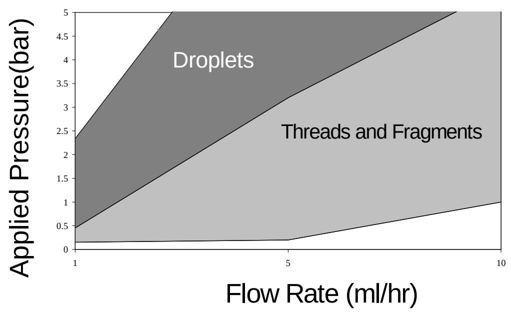

Fig.2 Operational map

It is seen from the operational map that there are two defined regions where droplets and threads are formed (Fig.2, 3)

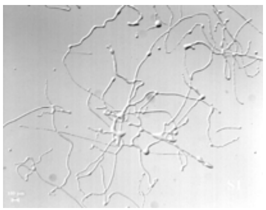

Fig.3a Threaded region

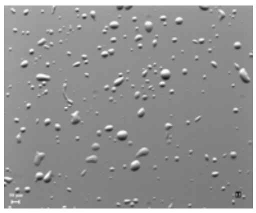

Fig.3b Droplet region

Threads also can form a scaffold, which is very important for biologically-related research (Fig.4)

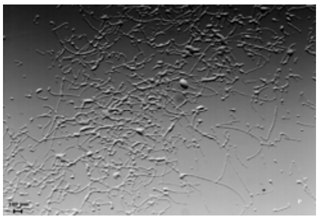

Fig.4 Typical collected residue of a formed scaffold

This flyer is based on the following publication:
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