# *Microneedle assisted micro-particle delivery: experiments using a skin mimicking agarose gel*

# Zhang&Das_MNConference_Abstarct_Experiment_FinalMicro needle assisted micro-particle delivery: experiments using a skin mimicking agarose gel

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Micro-particle delivery system is an advanced technology for transfer DNA loaded micro-particles to the target tissue. Cell damage was found as a problem for micro-particle delivery systems due to the impaction of high-velocity micro-particles[1,2]. A concept of combining microneedles with micro-particle delivery system, namely, microneedle assisted micro-particle delivery[3-6] is presented in this case. The preliminary conception is that a number of micro-particles are able to penetrate through the pierced holes (created by microneedles) to reach the target area. Thus, the particle velocity can be reduced appropriately by using this system. The system is consisted of three different stage, which are acceleration, separation and deceleration stage. In the experiment, an agarose gel was chosen as a model target for this system. Two different sizes of solid microneedle patches (Adminpatch) were bought from nanoBioSciences Limited Liability Company (LLC) (Sunnyvale, CA, USA) and used in the experiment. In addition, the penetration depths of micro-particles were analyzed in relation to a number of variables, namely, the operating pressure, the particle size, the MN dimensions. The result of micro-particle penetration in the gel was caught by a digital optical microscope. As shown in Fig.1, a number of stainless steel micro-particles penetrated through the pierced holes and reached a further penetration depth inside gel. In this case, stainless steel micro-particles are accelerated to approximately 130 m/s, which is significantly lower than other systems (e.g. PowderJet[7], Contoured shock tube[8]). Finally, the results show that the penetration depth increases from an increase in particle size, operating pressure and MN length. The above results directly show the feasibility of microneedle assisted micro-particle delivery.

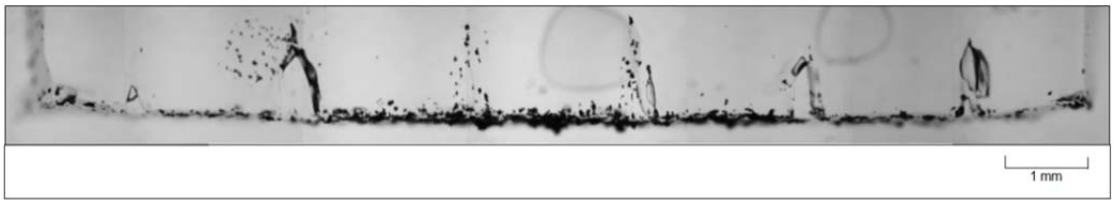


Fig. 1: Stainless steel micro-particle penetration in the agarose gel[4]

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