Smart maltose microneedle for blood sampling fabricated by stepwise controlled drawing

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***Abstract*— The present work designed to fabricate, characterize and use maltose microneedles for blood sampling application. Sugar microneedle was fabricated by drawing lithography technique and investigated for mechanical properties and required dimensions. Microneedle was subjected to plasma treatment to enhance hydrophilicity for rapid transport of bio sample.**

I. INTRODUCTION

Routine blood sampling is crucial for medical diagnosis to understand, prevent, and treatment of specific disease. It can provide critical information such as level of blood components, specific biomarker and improvements after treatment[1]. Many previous studies have been focussed on employing microneedles for body fluid sampling, highlighting its advantages compared to conventional hypodermic needles [2]. Biocompatible microneedles are fabricated using various methods. Maltose is a safe material for both body fluid sampling and drug delivery application[3].

II. METHODS

Microneedle is fabricated by inexpensive, simple stepwise drawing lithography technique[4]. The fabricated microneedle was investigated for mechanical properties to ensure it is strong enough to perforate skin when employed for blood sampling.

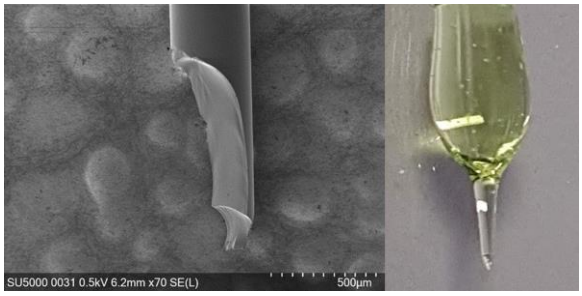

Figure 1. Moltose microneedles withSEM image showing tip of microneedle.

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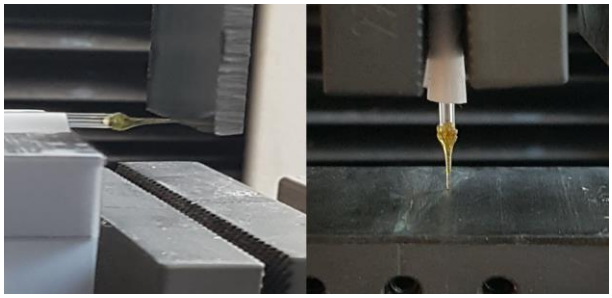

Figure 2. Moltose microneedles investigated for mechanical properties.

Figure 3. Superhydrophilic behaviour of moltose microneedle.

III. DISCUSSION & CONCLUSION

Super hydrophilic properties of plasma treated microneedle is demonstrated as shown in Figure 3. Microneedle integrated with glass capillary tube was brought in contact with the liquid. With in a short span of 10 seconds, the liquid sample is drawn from tip towards base of microneedle demonstrating its suitability for proposed application. The developed microneedle can be conveniently integrated with lateral flow device for biomedical diagnostic application.

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