EFFECT OF DIAMOND-LIKE CARBON COATING ON THE WETTABILITY OF POLYMERIC MICROCHANNELS

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The SU8 is a UV curable polymer and very useful for the fabrication of microstructures by photolithographic technique [1]. In this study, we have fabricated three categories of microchannel surfaces using SU8 as base material and diamond like carbon (DLC) coating: (i) without any coating on the channel surface; (ii) hydrogenated amorphous carbon (a-C:H) coating on SU8 and (iii) Si doped a-C:H coating on SU8. The thickness of the DLC films (deposited by PECVD) was around 70nm. The microfluidic channels were sealed with lids after DLC coating on both of the channel bottom surface and channel top surface. The water contact angles [2] were measured on the surfaces by sessile drop method. In the uncoated microfluidic device, the contact angles on the modified channel bottom surface (glass) and channel top surface (glass) were 61.50^0 and 43.30^0 respectively. In the DLC coated microfluidic devices, the contact angles on the a-C:H and the Si doped a-C:H surfaces were 72.60^0 and 81.20^0 respectively. We have recorded the microfluidic flow of dyed water [1] through the devices of each category. The total transient times (time taken by the meniscus to travel from the inlet to the end of the channel) were 1.0sec, 4.1sec and 9.7sec for the microfluidic flow through the devices of category (i), (ii) and (iii) respectively [1]. As expected we found, the surface of lower contact angle corresponds to higher wettability [3]. So by varying contact angle on a polymer surface, we have tuned the wettability of particular surface. Surface wettability played a major role in controlling the flow behavior in microchannnels. For future applications, the DLC nano film depositions on the selective portions of the microchannels in any specific microfluidic device may be useful to develop lab-on-a-chip system.

References

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