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**Application of near-field microwave microscopy in in-situ detection of microfluids under dielectric cover**[1] WEIQIANG SUN, Key Laboratory for Physics and Chemistry of Nanodevices, Department of Electronics, Peking University, YONG YANG, Institute of Microelectronic, Chinese Academy of Sciences, TAO FENG, SHENGYONG XU, Key Laboratory for Physics and Chemistry of Nanodevices, Department of Electronics, Peking University — Based on the capability of penetrating through low permittivity materials and the sensitivity to impedance of microwave, we have applied the near-field scanning microwave microscopy (NSMM) to the in-situ detection of microfluids packed with dielectric covers. By means of a NSMM system, we obtained two dimensional maps showing the frequency shift and magnitude of the reflection coefficient $S_{11}$, which correspond well to the spatial distribution and electrical conductance of various microfluidic structures underneath 15-200 $\mu$m thick dielectric covers. The spatial resolution and sensitivity are found closely related to the thickness of the cover layer. The underlying physics is discussed in detail. The time-resolvable detection of ionic concentration in microfluids is also demonstrated in different conditions for study of transport of particles in microfluids. This technique offers a real-time, in-situ and non-invasive approach for monitoring local chemical reactions, motion of fluids, distribution and concentration of ions in lab-on-a-chip systems, and has a potential to be developed for detection of cells and tissues.

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