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### Microfluidic platforms enabling single-cell electrical property characterization and cell type classification

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Size-independent intrinsic electrical properties of single cells i.e., specific membrane capacitance ( $C_{\text{specific membrane}}$ ) and cytoplasm conductivity ( $\sigma_{\text{cytoplasm}}$ ) are promising biophysical markers for cell status evaluation and cell type classification. In this talk, I will present our recent work on developing microfluidic platforms enabling the characterization of  $C_{\text{specific membrane}}$  and  $\sigma_{\text{cytoplasm}}$  in a continuous manner. From the perspective of technology development, I will also present four-generation microfluidic platforms for cellular electrical property quantification and highlight the proposed equivalent circuit models for raw electrical data translation. As to applications, I will report the classification of: Mouse tumor samples; Tumor cell lines with single oncogenes under regulation; Paired high and low-metastatic carcinoma strains; and stem cells in the process of differentiation. The microfluidic platforms developed in this study showed cell type classification, which may function as effective tools in further applications.

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### Isolation of bioactive components from the root of *Mirabilis jalapa* L.

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This study was carried out to isolate bioactive components from the roots of *M. jalapa* L. (Nyctaginaceae), which is widely used as folk remedy against numerous ailments such as carbuncles, urticaria, boils, ulcers, inflammation, etc. Aqueous methanolic extract was fractionated into four fractions according to polarity. Potential fractions identified with 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging capacity and activity against pathogenic bacterial and fungal strains. Thin-layer chromatography (TLC) was used for separation of bioactive components from potential fractions. Standards spotted alongside fractions of petroleum ether, chloroform and methanol (49:50:1) and chloroform, ethyl acetate and formic acid (5:4:1) was used as solvents for separation of terpenoids and flavonoids fractions, respectively. Chromatogram of terpenoids was developed with vanillin-sulfuric acid spray with heating, whereas, flavonoid spots were detected under ultraviolet rays at 365 nm. The relative front of each spot was calculated. One of the components of terpenoids corresponds to  $\beta$ -sitosterol. Each spot was further subjected to free radical scavenging and antimicrobial assays. TLC plate developed with 0.2% DPPH spray for detection of free radical scavenging spots. Susceptibility against pathogens such as *Staphylococcus aureus*, *Streptococcus mutans*, *Escherichia coli*, and *Candida albicans* was determined using agar well diffusion assay. Two spots, one from terpenoids fraction (5F1) and the other from flavonoids fraction (1F3), showed free radical scavenging capacity. 1F3 spot was active against both *S. aureus* and *C. albicans*, whereas, 5F1 spot was active against *S. aureus* alone. Our findings substantiated the use of MJ in folk remedy. Therefore, *M. jalapa* L. could be explored for potential source of free radical scavenger and/or broad spectrum antimicrobial agent against clinically important human pathogens.

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