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**New impedance and electrochemical image techniques for biological applications**

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A method to image local surface impedance and electrochemical current optically is developed for biological applications. The principle of the impedance imaging is based on sensitive dependence of surface plasmon resonance (SPR) on local surface charge density. The technique can image local surface impedance and charge while providing simultaneously a conventional surface plasmon resonance (SPR) image. By applying a potential modulation to a sensor surface, it is possible to obtain an image of the DC component, and the amplitude and phase images of the AC component. The DC image provides local molecular binding, as found in the conventional SPR imaging technique. The AC images are directly related to the local impedance of the surface. This imaging capability may be used as a new detection platform for DNA and protein microarrays, a new method for analyzing local molecular binding and interfacial processes and a new tool for imaging cells and tissues.