299. Title: Co-integrated microfluidic and THz functions for biochip devices
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Abstract:TeraHertz (THz) spectroscopy is becoming an alternative way to probe biological interactions in real-time conditions. However, accurate and reproducible THz measurements of aqueous solutions, largely represented in life sciences, remain difficult. A THz microsystem which couples both electromagnetic and microfluidic integrated functions is presented here. Its technological process is accurately detailed and enables easy designs of advanced THz and microfluidic functions. It is composed of the deposition of gold wires on a glass wafer to guide the THz waves. Then, a whole silicon wafer is bonded by using a thermosensitive-polymer thermo-compression. Silicon is deep-etched to create the microchannels which are finally covered with a second glass wafer. This bonding-etching process enables huge freedom and independence for electromagnetic and microfluidic designs. The technological process characterization has shown that the manufactured biochip is compatible with pressures up to 37 bar. First measurements with empty and water-filled channels have been carried out and have shown the ability to perform THz spectroscopy inside the chip. Then, first measurements on proteins have been performed and shown the system ability to probe protein concentration. This kind of microfluidic microsystem, allowing complex design for integrated electronic and microfluidic circuits, defines a true new instrumental way for life science investigations.