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Micro-Ball Lensed Fiber-Based Glucose Sensor

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The compact micro-ball lens structure fabricated at the cleaved tip of a microfiber coupler (MFC) is proposed and demonstrated for sensing various glucose concentrations in deionized water. The MFC was made by fusing and tapering two optical fibers using a flame brushing technique. It was then cleaved at the center of the minimum waist region to form a ball lens at the tip by an arcing technique using a fusion splicing machine. The proposed glucose sensor uses the micro-ball lensed fiber as a probe and a mirror as a target. The working mechanism of this device is based on the observed reduction in the peak power of the sensor wavelength spectrum as the concentration of glucose is increased. For a concentration change from 0 to 12 volume%, the output intensity of the sensor decreases linearly from -57.4 to -60.5 dBm with a sensitivity of 0.26 dB/% and a linearity of more than 99%.

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