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Cancer cell aggregate hypoxia visualized *in vitro* via biocompatible fiber sensors

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Abstract

To fully understand biological behavior *in vitro* often dictates that oxygen be reported at either a local or a cellular level. Oxygen sensors based on the luminescent quenching of a specific form of electrospun fiber were developed for measurement of both gaseous and dissolved oxygen concentrations. Electrospinning was used to fabricate “core-shell” fiber configurations in which oxygen-sensitive transition-metal porphyrin complexes are embedded in an optically clear, gas permeable polycarbonate polymer ‘core’ while polycaprolactone provided a protective yet biocompatible ‘shell.’ By taking advantage of the resulting high sensitivity and fast response of electrospun core-shell fiber sensors, we were able to locate and image hypoxic regions in contact with aggregates of glioblastoma cells. Nanoscale, biomimetic sensors containing oxygen-sensitive porphyrins are particularly well suited to biological applications. These ‘smart’ nanofiber based sensors do not consume oxygen, their mechanical