Study on chemiluminescent probes for superoxide anions – control of chemiluminescence resonance energy transfer by cyclomaltooligosaccharide (cyclodextrin) -

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In providing chemiluminescent probes that have high chemiluminescence intensity and high specificity to superoxide anions, novel chemiluminescent probes involving cyclodextrins covalently bound to 6-(4-methoxyphenyl)imidazo[1,2-a]pyrazin-3(7H)-one with fluorescein were synthesized and characterized. Using the hypoxanthine-xanthine oxidase system for the generation of the superoxide anions, these novel chemiluminescent probes showed higher superoxide-induced chemiluminescence intensity than that of 6-[4-[2-[[N'-(5-fluoresceinyl)thioureido]-ethoxy]phenyl]-2-methylimidazo[1,2-a]pyrazin-3(7H)-one (FCLA). When tested at a probe concentration of 1.0 µM, a compound, in which 6-(4-methoxyphenyl)imidazo[1,2-a] pyrazin-3(7H)-one and fluorescein are covalently attached on the secondary and primary hydroxyl faces of γ-cyclodextrin, respectively, showed green-luminescence intensity that was 26 times that of FCLA, which was also the highest luminescence intensity in this present study. At probe concentrations of less than 1.0 µM, the ratio of the superoxide-dependent chemiluminescence intensity to the background chemiluminescence intensity for the compound was higher than that of FCLA.