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A solid-state electrochemiluminescence sensing platform for detection of catechol based on novel luminescent composite nanofibers

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Abstract A solid-state electrochemiluminescence (ECL) sensing platform based on the novel luminescent composite nanofibers for detection of catechol has been developed. The carboxylated multi-walled carbon nanotubes (MWNTs) and Ruthenium (II) tris-(bipyridine) ($Ru(bpy)_3^{2+}$) doped nylon 6 (PA6) luminescent composite nanofibers (Ru-MWNTs-PA6) were successfully fabricated by a one-step electrospinning technique. The Ru-MWNTs-PA6 nanofibers, with unique 3D nanostructure, large specific surface area and a larger amount of immobilized-$Ru(bpy)_3^{2+}$, maintained the photoelectric properties of the $Ru(bpy)_3^{2+}$ ions and exhibited excellent ECL behaviors on glassy carbon (GC) electrode. As a solid-state ECL sensing platform, the Ru-MWNTs-PA6 nanofibers can sensitively detect low concentration catechol by monitoring the phenol-dependent ECL intensity change. The detection limit for catechol is 1.0 nM, which is comparable or better than that in the reported assays. The solid-state ECL sensor displayed wide linear range, high sensitivity and good stability. It holds promise for the electrospun nanofibers-based ECL sensors have a great potential for routine analyses.

Keywords luminescent composite nanofibers, Electrospinning, solid-state

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