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Single-molecule porphyrin-metal ion interaction and sensing application

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Abstract

It remains a significant challenge to study the interactions between metal ions and porphyrin molecules at single ion level. Here, we constructed a nanopore-based sensing for label-free and real-time analysis of the interaction between Cu²⁺ and 5,10,15,20-tetrakis(4-sulfonatophenyl)-porphyrin (TPPS). The results demonstrate that emerging electronic signatures of the Cu²⁺-TPPS complex that is completely different from the original free TPPS were observed in the α -hemolysin (α -HL) nanopore. Based on the distinctive electronic signal patterns between TPPS and Cu²⁺-TPPS complex, the unique nanopore sensor can achieve a highly sensitive detection of Cu²⁺ in aqueous media. The frequency of signature events showed a

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