**Abstract**

In this work, Vertically oriented WO3 nanoflakes array films was synthesized via the template free facile [electrodeposition](https://www.sciencedirect.com/topics/materials-science/electrodeposition" \o "Learn more about Electrodeposition from ScienceDirect's AI-generated Topic Pages) method at room temperature. WO3 nanoflakes arrays was adopted as an effective cathode electrode material in the [electrochemical devices](https://www.sciencedirect.com/topics/materials-science/electrochemical-device) structure. The WO3 material exhibits superior [electrochromic](https://www.sciencedirect.com/topics/materials-science/electrochromics" \o "Learn more about Electrochromics from ScienceDirect's AI-generated Topic Pages) performance shows a larger optical modulation (68.89% at 550 nm), faster response time (tb = 1.93 s, tc = 2.87 s), a higher coloration efficiency of about 154.93 cm2 C−1 and with excellent cyclic stability over 2000 cycles without any degradation. Futhermore, WO3 nanoflakes array film was used for the detection of H2S gas that showed excellent response. A considerable increase in porosity and high surface roughness could be conducive for such an excellent and superior electrochromic characteristic as well as gas sensing performances. These results indicates that fabricated WO3 nanoflakes array film by a simple strategy holds a great promise for potential multifunctional applications such as smart windows, gas sensors and [optical sensors](https://www.sciencedirect.com/topics/materials-science/optical-sensor).