

EGU26-8204, updated on 13 Jun 2026

<https://doi.org/10.5194/egusphere-egu26-8204>

EGU General Assembly 2026

© Author(s) 2026. This work is distributed under the Creative Commons Attribution 4.0 License.



Towards lower-cost spectroscopic sensors: Applications in mobile monitoring and roadside measurements of NO₂

Dean Venables, Conor Dorney, Ashley Edmonds, Rohit Vikas, and Meng Wang

School of Chemistry, University College Cork, Cork, Ireland (d.venables@ucc.ie)

Nitrogen dioxide (NO₂) is a major urban air pollutant, but current low-cost sensors for NO₂ based on electrochemical cells have important drawbacks, including modest accuracy and susceptibility to temperature, humidity, and chemical interferences. These sensors are also too slow for mobile monitoring and for measuring the large and rapid fluctuations of NO₂ in the transport microenvironment. These are important monitoring approaches and settings for NO₂ because vehicles are the dominant source of NO₂ in cities. Here we present our work in adapting cavity-enhanced absorption spectroscopy (CEAS) to develop fast (< 5 s), sensitive (±1 ppb), and portable sensors for NO₂ at lower cost.

We characterise sensor performance in laboratory intercomparisons, and present adaptations to different platforms (vehicles, bicycles, and backpacks). Case studies are presented of mobile and stationary monitoring of transport emissions in Cork city and in smaller towns in Ireland. These measurements show the disproportionate impact of a small number of highly polluting vehicles. A perspective on the challenges and prospects for this approach is discussed.