Highly enhanced NO_2 gas sensing performance with Mo_2CT_x MXene sensor

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MXenes are a new class of two dimensional materials consisting of few atoms thick layers of transition metal carbides, nitrides, or carbonitrides. Previous research suggested that metallic $Ti_3C_2T_x$ MXene gas sensor shows ultrahigh gas sensing performance in the view of signal to noise ratio than other 2D materials like reduced graphene oxide, molybdenum disulfide and black phosphorus. In this work, we fabricated semiconducting Mo_2CT_x MXene gas sensor through simple spin coating method and achieved 10 times higher signal to noise ratio with NO_2 gas than metallic $Ti_3C_2T_x$ MXene sensor. Also, different sensing behaviors were observed that increasing response when exposed to volatile organic compounds gases like ethanol and decreasing response to strong polar gases like NH_3 and NO_2. Our semiconducting Mo_2CT_x gas sensor will be a strong candidate for detecting hazardous gases due to distinct sensing response and high signal to noise ratio.