**ABSTRACT**

MXenes are recently developed two-dimensional (2D) inorganic compounds with few atomic layers that have exceptional properties, for instance, thermal, magnetic, optical, electronic, and mechanical. Owing to their excellent properties, chemical composition, and layered structure, MXene is one of the prime materials for the advancement of biosensors, among other latest nanomaterials. Fabricating advanced biosensors with high selectivity and sensitivity is one of the most required concerns in biosensors. Numerous nanomaterials, including MXenes, have been introduced to fabricate biosensors for obtaining high selectivity and sensitivity. Therefore, in this book chapter, advanced biosensors were discussed based on 2D MXene for biomedical, agricultural, and environmental remediation applications