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Sommario/riassunto	The main objectives of this book are (i) to investigate the electrochemical behavior and the analytical performance of a novel ultramicroelectrode array (UMEA); (ii) to assess the analytical parameters of square-wave anodic stripping voltammetric measurements (SWASV) using the UMEA; and (iii) to estimate the potential of the UMEA in developing decentralised analytical equipments for the determination of trace concentrations of heavy metals in natural waters. Surface analytical techniques (SEM, ESEM, and AFM) showed that the UMEA chips are of high quality in manufacture. Cyclic voltammetric and chronoamperometric experiments proved that the electrochemical behavior of the UMEA is dominated by the features characteristic for single microelectrodes.Chronocoulometry was found to be the most suitable method in generating the Hg-film of good quality. A new UMEA chip could be plated at least ten times, corresponding to about 500 measurements of trace metals in synthetic aqueous solutions. Using SWASV, detection limits of <0.1 ï¿g/l could be achieved for the metals (Pb, Cd). Precision and accuracy were found to be approx +/-10% of RSD.In natural waters, the results obtained with the UMEA sensor showed a reasonably good agreement with HR-ICP-MS analyses. Different experimental parameters were optimised and investigated. Interferences (e.g., DOC) were significantly reduced through medium exchange and standard addition. Ultrasonic bath proved to be very efficient in resurfacing electrodes in laboratory.The

UMEA sensor shows a great potential in developing a portable trace metal analyzer. However, for in situ and on-site measurements, the protection of the UMEA sensor from fouling seems to be inevitable. In order to achieve a pure microelectrode behavior with the UMEA, increasing the ratio of interelectrode distance to electrode diameter is recommended for further developments.