Electrogeneration of Sol-Gel Thin Films

Sol-gel electrochemistry has gained great popularity in the past decades, mostly because of the ease of formation of silica and organosilica films with tailor-made properties that can be advantageously exploited for several applications when coated on a suitable electrode surface. In particular, silica-based materials displaying a regular structure at the mesoporous level have been found to be very promising electrode modifiers because they ensure fast mass transport processes, which are often rate-determining in electrochemistry. In this context, an original electrochemical method has been developed to indirectly generate sol-gel-derived (organo)silica thin films, with promising applications in the field of bioelectrochemistry and sensors and beyond. After a brief introduction to the field, this lecture will present the concept the electrochemically-assisted generation of sol-gel films, its interest for bioencapsulation and elaboration of electrochemical bioreactors, its suitability to get nanostructured electrode surfaces with preferential pore orientation, including their modification with organo-functional groups and their permselective properties, and will end with promising applications in electroanalysis and sensors, electrocatalysis, energy storage or electrochromism.