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Gellan hydrogel and its modification as a diagnostic and cleaning tool for paper artworks: A case study

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Wet cleaning of ancient papers is one of the most delicate and important steps in a conservation treatment. It allows the improvement of the optical qualities the removal of pollution, and the partial dissolution of organic substances resulting from cellulose degradation

In this contest, a new wet cleaning technique based on the use of a rigid hydrogel of Gellan gum has been recently developed. This gel is able to gradually release the water contained within their polymer network, also to absorb the water-soluble degradation products present on paper. This compound is rigid and therefore its application and removal are fairly simple not leaving residues on the paper surface after treatment. Moreover, it could be easily combined with selective electrochemical biosensors, suitable to monitor the cleaning process. In this way, the cleaning time could be optimized, minimizing time costs and unnecessary treatments.

Here we report the results obtained by applying the proposed system to the "Breviarium Romanum ad usum Fratrum Minorum", of 18th century, highlighting the advantage and the potentiality of this new tool with respect to the traditional old paper cleaning methodologies. We also used Gellan gel as a carrier of a tuned cleaning agent, that is the enzyme proteinase K to remove animal glue from the cover of the Breviary respectively. In this system, the enzyme works as selective cleaning agent, hydrolyzing not easily removable glues into smaller fragments soluble into the gel, which, in turn, plays the role of support and removal matrix for the enzymatic products. To assess the validity of this approach, several invasive and not invasive techniques, such as, fluorescence microscopy, SEM, FTIR-ATR, HPLC have been used.

Biography

Academic career 2014-until now: Associate Professor in Analytical Chemistry at the Department of Chemical Science and Technologies of the University of Rome "Tor Vergata"; 2002-2014: Senior Researcher in Analytical Chemistry; 1999: PhD Fellowship at the School of Chemical Sciences of Dublin City University (Ireland); 1998-2001: PhD in Chemistry Science; 1997: Master degree 110/110 cum laude in Industrial Chemistry Research. Her research activity is focalized on the study and development of disposable electrochemical tools for seafood toxins, development of immunosensors and interference-free biosensors based on screen printed electrodes (SPEs) in the field of environmental, cultural heritage, clinical and food analysis, using for their validation spectrophotometric and chromatographic methods. She has been involved in the She collaborates from 2006 until now with the Department of CEMIS-OULU of the University of Oulu. She received People-exchange-Marie Curie International Research Staff Exchange Scheme IRSES-PEOPLE-2008 at the School of Chemistry University of Melbourne (Australia). Her research work had been presented at several national and international scientific meetings. 7 chapters on international books, 38 on international scientific papers, 12 proceedings.

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