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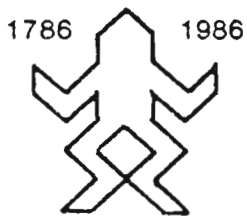

Bicentenario dei più famosi esperimenti di
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THE ELECTROCHEMICAL OXIDATION OF FIBRINOGEN: A PRELIMINAR INVESTIGATION

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The electrochemical behaviour of the blood coagulation factor fibrinogen has been investigated mainly in order to assess the blood compatibility of metallic prosthetic materials; it was found that, when the spontaneous potential of a metal at the interface with blood is positive vs. NHE, thrombus deposition occurs(1). In particular, at potentials between -200 and +80 mV vs. SCE, fibrinogen undergoes, on a Pt electrode, anodic electropolymerization to fibers resembling, at the electron microscopy, those obtained by enzymatic polymerization of fibrinogen with thrombin, i.e. noncrosslinked fibrin (2).

More recently a great interest has arisen about the use of crosslinked fibrin in medical and surgical fields, such as the use of fibrin glue in the reconstruction of damaged tissues and in the pre-clotting of artificial vessels; composites of synthetic polymers and fibrin are used to make biolized blood vessels (3). Such new interest for the fibrinogen encourages to reinvestigate the electrochemical reactions of this blood protein.

Purified human fibrinogen (KABI, medical preparation, lot 51514) was tested electrochemically in a three electrode cell already described (4). The electrochemical apparatus was an AMEL system composed by a Mod. 555 A potentiostat, a Mod. 567 function generator, a Mod. 560 interface and a Mod. 862/A recorder. The experiments were carried out at 37°C in physiologic saline (0.154 M NaCl), carefully deaerated with nitrogen before the addition of fibrinogen.

Fig. 1 shows a current-potential plot for a 0.07 mg/ml fibrinogen solution, measured on Pt stationary electrode in stirred solution. The current due to the oxidation process attains its maximum at about +65 mV/SCE and disminishes at higher potentials owing to electrode coating and fibrinogen denaturation (2), so confirming the results obtained by other authors with different electrochemical techniques (5).

The potentiostatic electrolysis of a solution containing 3 mg/ml of fibrinogen, carried out at +65 mV/SCE, deposits on the electrode a thin porous film, the nature of which is under investigation by electron scanning microscopy, differential scanning calorimetry and electrophoresis.

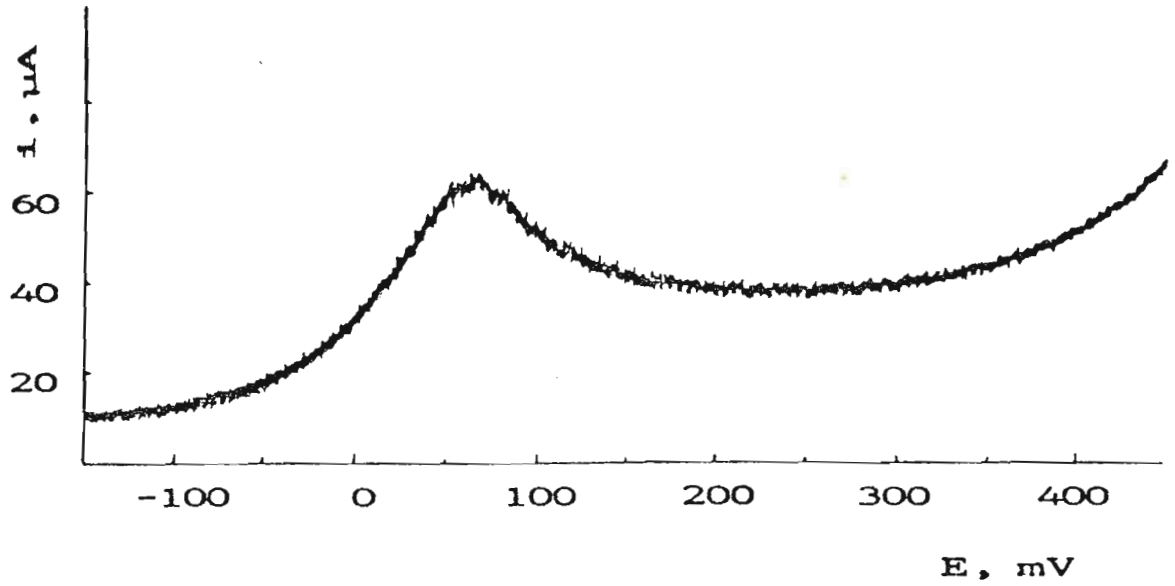

Fig. 1 - Current-potential plot for 0.07 mg/ml fibrinogen in 0.154 M aqueous NaCl. Working electrode 490 mm^2 area Pt electrode; reference electrode SCE; voltage scan rate 5 mV/sec.

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