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A SIMPLE DEVICE FOR MICROINJECTIONS, MANIPULATIONS AND MEASUREMENTS USING AN ELECTROMORPHOLOGICAL CHIP UNDER MICROINTERFEROMETRIC CONTROL OF THE INTERFACE AND MEMBRANE PROCESSES AT THE THICKNESS RANGE OF 5-1000 NM AT DIFFERENT ANGLES

ABSTRACT. Micromanipulations, perfusions and measurements performed using glass microelectrodes filled with an electro-lyte is a conventional technique for experimental morphological and membrane electrophysiological studies at a single cell and membrane surface level. The typical (effective) diameter of the end of the glass microelectrode is from 500 up to less than 100 nm, which prevents one from observing it using a standard optical microscope in accordance with the optical resolution criteria, since the diameter less than 500 nm is indistinguishable within the interference zone. Microprocessor programming of the puller (microforge) that provides pulling and tearing allows to obtain in certain regimes the adjusted diameter and shape of the micropipette tip, although this result is not fully controlled due to the above limitations. In this connection it is necessary to design the control devices for the micropipette tips both at the preparation and operation stages (intracellular or extracellular insertion). This method also should provide visualization of the processes occurring upon interaction of the microelectrode tip with the cell in real time, depending on the electrode type and state, which allows to level the artifacts arising with the systematic error frequency from the uncontrolled operation of the micropipette tip after different ways of the microelectrode filling with the electro-lyte. We propose an installation scheme that solves the above problems by means of introducing an interferometric device for microscopic control of the microelectrode and micromanipulator or microperfusor, for the first time for a given type of optical instruments combined with the interferometric optical scheme.

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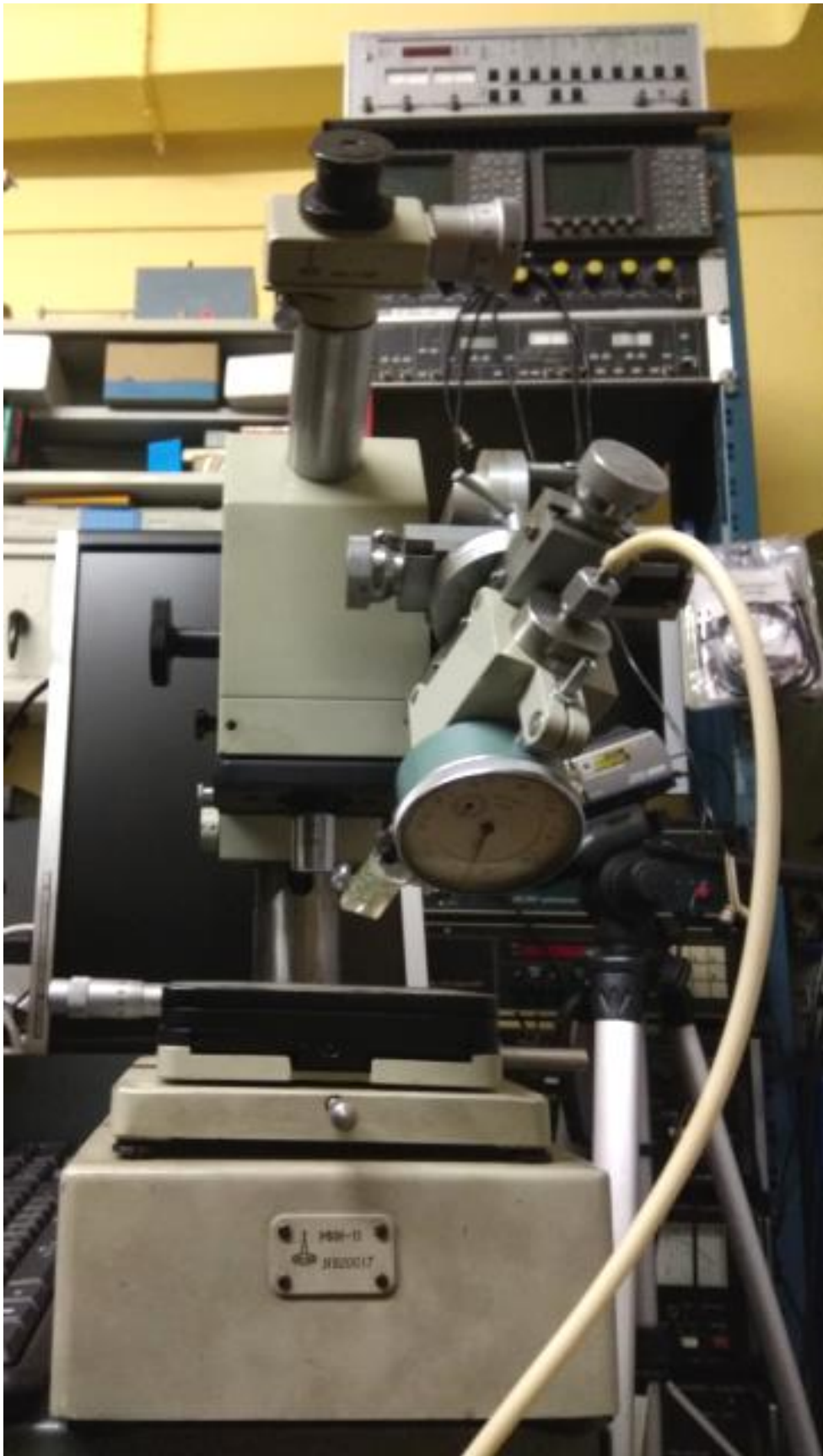


Fig. 1. The general configuration of the installation.



Fig. 2. Systems of angular positioning of the micromanipulator.



Fig. 3. The installation stand of the interference detection system for the microinjection circuit with a capillary chromatographic micro-column with parallel signal removal from the column.

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