activity during light excitation with the photonic chip. The system was characterized and the chip is able to create 10 μm diameter spots on the surface of the chip, with an intensity up to 15 mW/mm^2. We are currently performing biocompatibility tests in order to be able to grow the neurons on the surface of the chip.

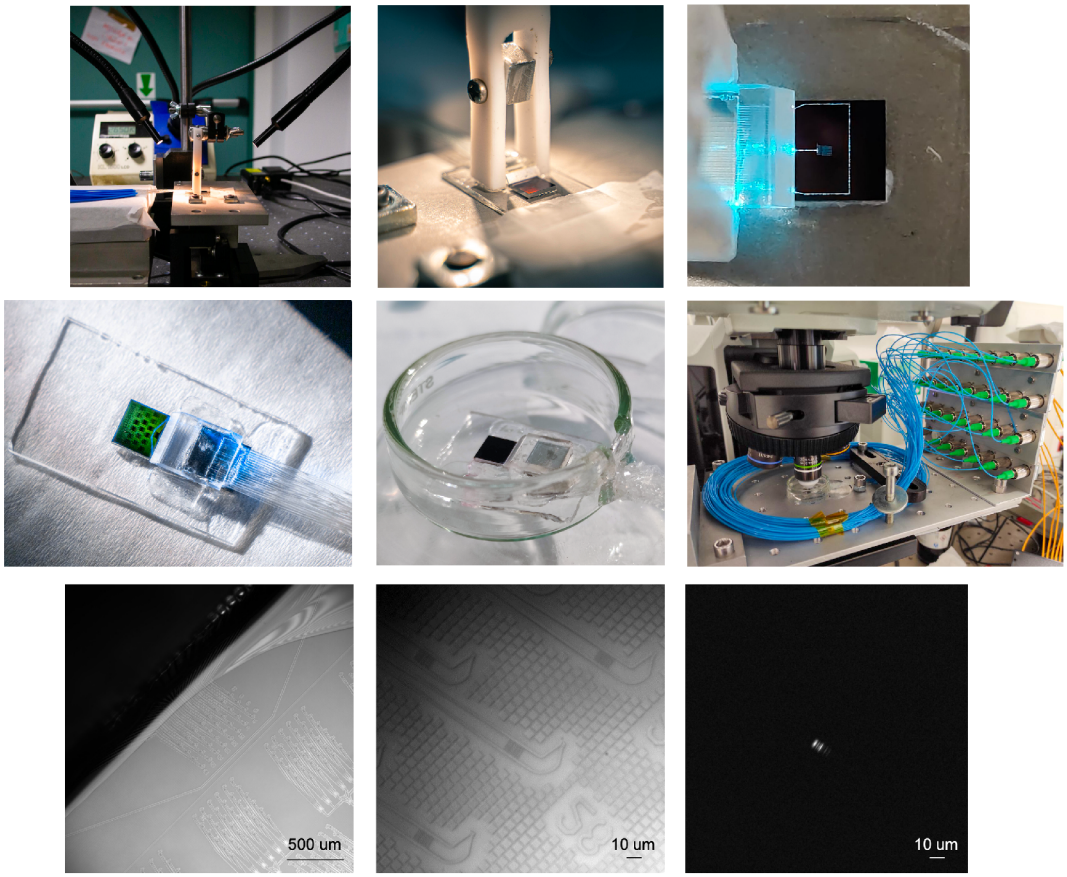

Figure 8. In the upper part of the figure, is shown from left to right the alignment stage, the detail of the teflon fork that holds the fiber array and a photo of the aligned system, with the illuminated waveguides. In the middle row, is shown the glued chip+fiber array system, its placement in the petri dish and the microscope platform that hosts the system. In the last row, is shown the chip seen from the microscope: an array, the detail of one scatterer in a matrix and the spot created by it.

6. CONCLUSIONS

In this work were presented two possible ways to perform single neurons excitation on in-vitro 2D neuronal networks. A DLP system was integrated to a microscopy setup and used to induce neuronal activity on one or more single neurons and on groups of them. Moreover, another platform to excite single neurons was described: it is a photonic chip with aperiodic gratings that create spots with neuronal body dimensions on a desired plane, with an intensity up to 15 mW/mm^2. Both these systems were designed and tested with the aim to induce engram formation and to study the process of memory, but these platforms are extremely versatile and can be applied to other different brain functions and pathologies at elementary level, among which memory and amnesia are just two examples.

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