Light coupling in microscale polymer photonic circuits

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Photonic integrated circuits (PICs) are devices that integrate multiple photonic functions. The visible light is guided between components by light waveguides of the same order as light wavelength, i.e. 1-5µm or even less [1]. Because of the size of connections, coupling light into PICs is a challenging task previous to characterizing them. The aim of our group is to turn a passive PIC into an active one by adding layers of electro-optics materials, either as a component within the light path, or deposited onto the waveguide affecting the evanescent field of the guided light. Testing the light behavior inside the PICs may be hampered by the arduous light coupling from external sources. This problem may be faced up from several points of view.

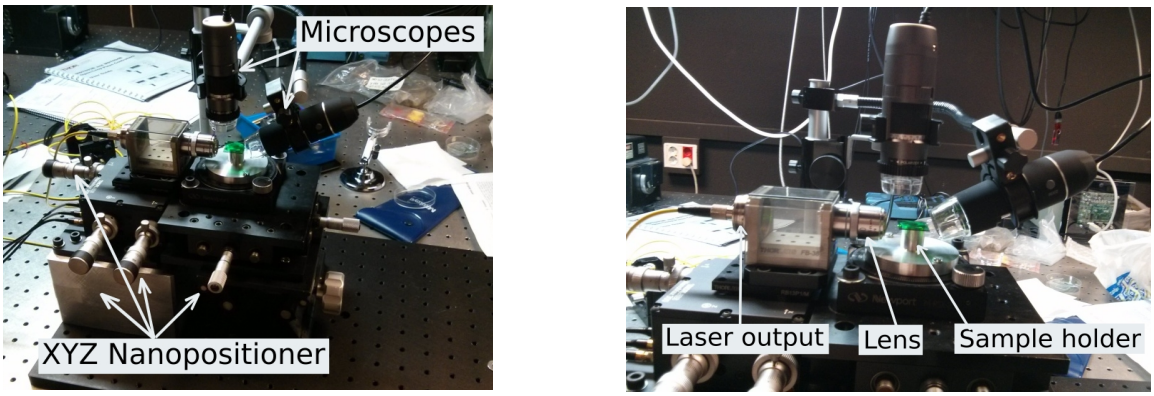

Figure 1. Different views of the X-Y-Z nanopositioner setup for coupling light to PICs.

We are developing improved versions of classical coupling setups. It is possible to appreciate in the figure 1 one of our latest realizations to couple light into the PICs. It consists of an X-Y-Z electrically-manual controlled nanopositioned microscope objective, two microscopes and green/red He-Ne lasers. The nanopositioner let us focus the laser beam into the small cross section of the waveguide, where the first microscope is placed. The second microscope is used to analyze the output signal in the opposite end of the waveguide, which can be eventually brought to another detection system. Moreover, others alternative mechanisms are being developed now in the group for light coupling, being the most promising solutions those in which light is coupled by difractive elements [2] or generating it internally.

References

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