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1. Introduction

The main challenges for future wireless communications are terabit-per-second data rate and coverage everywhere. Such performance could be achieved by exploiting the sub-THz frequency regime (100 GHz – 1 THz) [1], in both Terrestrial and Non-Terrestrial Networks. One of the key-enabling subsystems to operate in the sub-THz frequency range is the antenna. In modern communication environments, the antenna system generally consists of antenna arrays and reflective/refracting surfaces. The present research activities on these topics require advanced materials with good electrical properties (to achieve efficient devices) and a high degree of reconfigurability [2]. These challenges motivate the research line on graphene at sub-THz.

2. The experimental activity

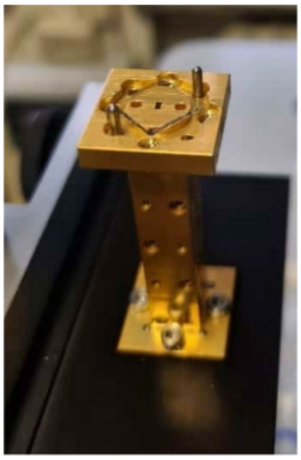

Fig. 1. Example of waveguide-based experimental setup in the 110-170 GHz frequency band

Previous studies demonstrated that reconfigurable absorbers [2], and screens [3], can be obtained in X-band (7-13 GHz) with properly designed graphene layers. Ongoing projects aim at extending these results in the millimeter-wave range (above 30 GHz) [4], and beyond (sub-THz). Such activities require a complete characterization of the properties of the adopted advanced material(s). To this end, we are developing a set of experimental setups to characterize multilayer Chemical Vapor Deposition, CVD, graphene samples in the 65-750 GHz frequency range. An example is shown in Fig. 1. The gold-plated metal waveguide is connected to a millimeter-wave extender (black surface) which is then connected to a Vector Network Analyzer (not visible). The square-shaped glass sample (of edge length of 8.5 mm) is placed on top of the waveguide interface/flange. The graphene layers are transferred on one side of the glass sample. The electromagnetic field is excited/probed through the rectangular aperture (open-ended waveguide 1.6 mm x 0.8 mm) at the center of the top metal flange. This measurement configuration is simpler than the one reported in [5], where lens-based horns were adopted. Consequently, it will allow for an accurate modeling of the electromagnetic environment, leading to a more precise estimation of the material parameters. Moreover, the present measurement setup can be easily calibrated by connecting known devices to the upper waveguide flange.

The results of a measurement campaign carried out on multilayer graphene samples will be presented at the workshop along with possible device configuration that could be developed accordingly.

3. Acknowledgement.

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