PLANAR ANTENA ARRAY OVER THE NOVEL METALLIC NANOWIRE (MNM) FOR MM-WAVE APPLICATIONS

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INTRODUCTION

The increase in data quantities transferred via the internet and the boom in moblie devices and wireless communtication traffic drive the need for wider band and faster wireless links. For this reason, the millimeter wave (mm-wave) frequency range (30 GHz to 300 GHz) is recieving increased attention, specially the V band (57 GHz to 64 GHz) for household and consumer electronics applications.

Because of the high atmospheric absorption in this band it is required to implement beamforming techniques in order to overcome the transmission losses. This is done with antenna arrays.

This work aims at developing a high performance antena array for 60 GHz communications over the MnM substrate.

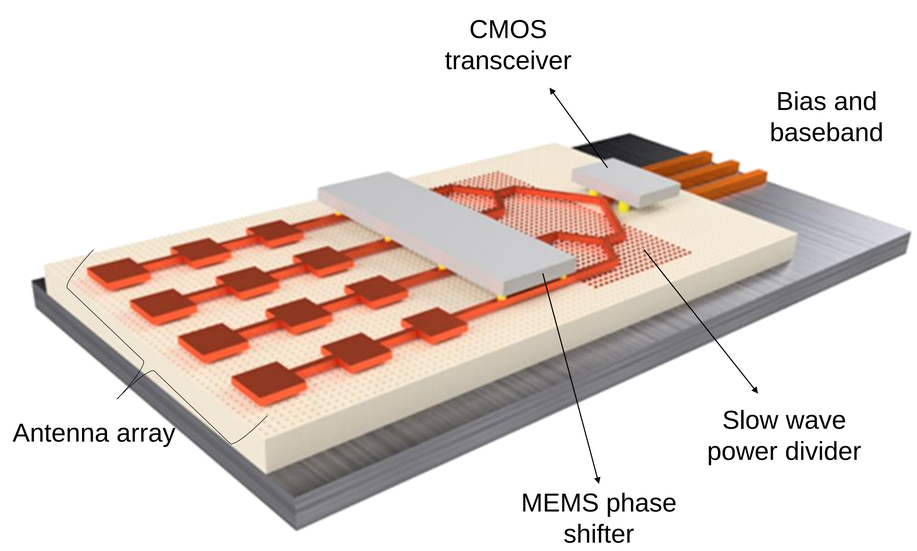

Figure 1 – A mm-wave transciever based on the MnM substrate

ANTENNA ELEMENT

First objective is to design a single antena element using planar technology to verify the design method and the fabrication process.

The chosen antenna geometries are the rectangular patch antenna and the Yagi-Uda antenna, both set to resonate at 60 GHz.

FABRICATION PROCESS

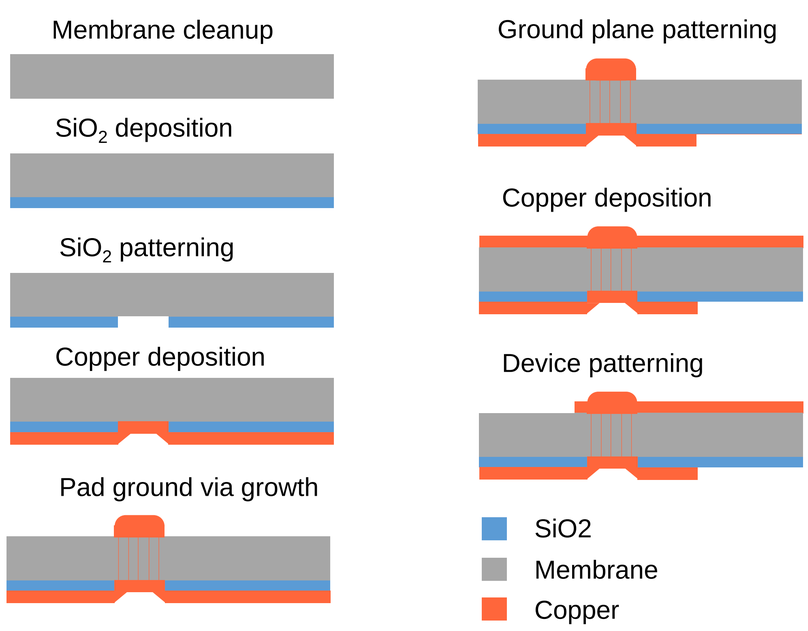

Figure 2 – Fabrication steps used to fabricate the antenna and CPW pads

RESULTS

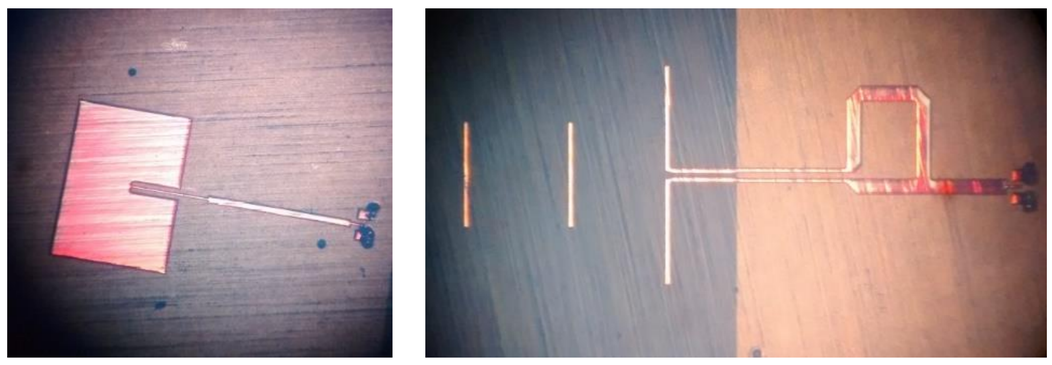

Figure 2 – Fabricated antennas

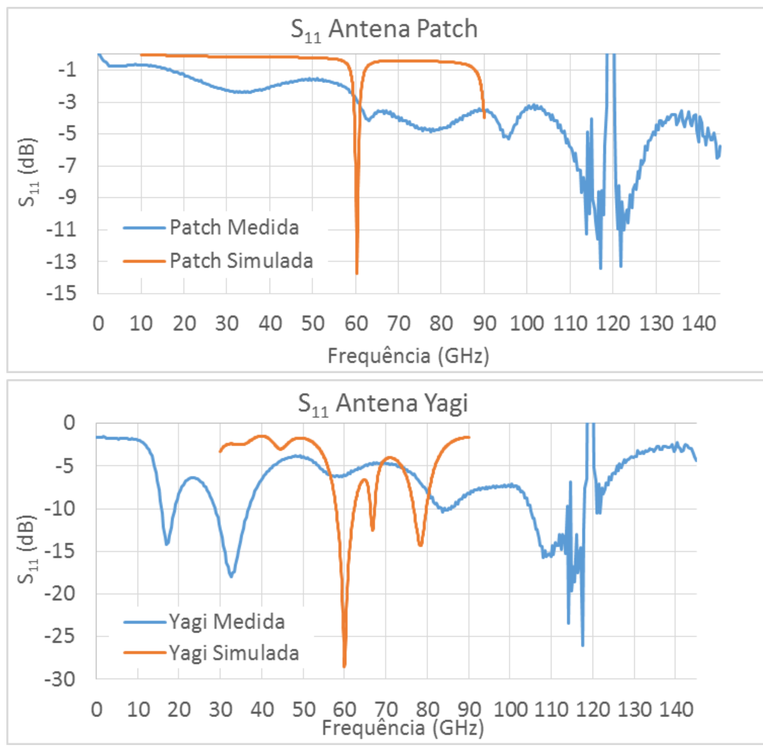

Figure 3 – Simmulation and measurement results

NEXT STEPS

Fabricate another batch of antenas without the via growth step, probable source of nonconformities in our manufacture process.

Design a nondestructive method to extract the dielectric constant and loss tangent of the substrate to improve the data we already have.

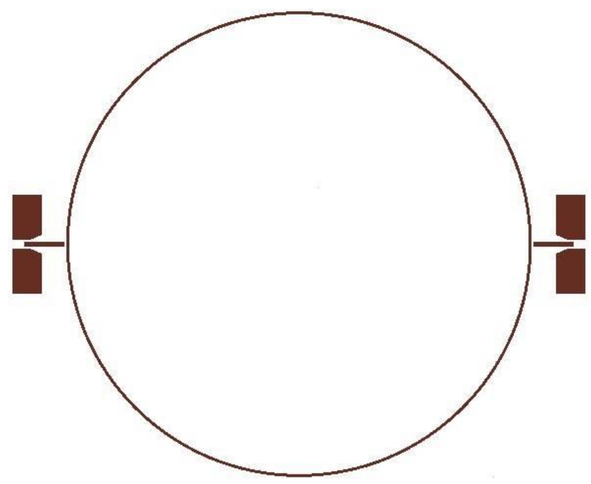

Figure 4 – Microstrip resonant ring with via-less CPW-microstrip transition for substrate characterization

AKNOWLEDGMENTS

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