

Non-reciprocal microwave behavior on magnetic nanowired substrates

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Nowadays the growing demand for novel miniaturized and more functional passive non-reciprocal microwave devices has motivated very much research activity around nanotechnology and nanosciences. This has promoted the application of novel structures based on nanocomposite materials, which consist of a very large number of magnetic nano-objects embedded in a porous host matrix with properties that are only characteristic at the nanoscale. For instance, nanocomposites like the so-called magnetic nanowired substrates are self-biased, so the application of an external magnetic field using electromagnets is unnecessary, which in turn lead to a significant miniaturization of potential devices based on these systems [1-3].

In this work we present a study, on one hand, on the realization of magnetic nanowired substrates with specific geometric factors and magnetic properties. This has been achieved by controlling the nanocomposites microstructure by using an electrodeposition technique for obtaining an asymmetrical growth of the nanowires inside a nanoporous template. On the other hand, we present results on the application of magnetic nanowired substrates for obtaining a microwave non-reciprocal behavior, which is observed from the difference between the microwave absorption in the forward and backward directions using a microstrip line geometry. This behavior can be tuned by an adequate choice of the nanowires materials, but also by controlling the nanowire array geometry, which lead to a microwave absorption dependence on the permittivity and permeability of the magnetic nanowired substrate.

References

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