Director de tesis:	Dr. Enrique Castro Camus
Sinodales:	Dr. Daniel Alberto May Arrioja (Sinodal Interno, Secretario) Dra. Elodie Claire Strupiechonski (Sinodal Externa – CINVESTAV Querétaro, Vocal) Dr. Enrique Castro Camus (Director de Tesis, Presidente del Jurado)
Tesis:	"DESIGN AND FABRICATION OF PHOTONIC COMPONENTS FOR TERAHERTZ FREQUENCIES"

Resumen:

In this thesis we demonstrate numerically and experimentally four novel photonic devices for terahertz frequencies fabricated by three-dimensional printing. We present, to the best of our knowledge, the first 3D printed dielectric frequency filter for the terahertz band. The filter is formed by a dielectric diffractive grating printed over a rectangular waveguide of the same material. The operational principle consists in couple laterally an electromagnetic beam into the grating; if the exit angle of the diffracted mode is equal or greater than the total internal reflection angle inside the rectangular waveguide, the radiation will be confined and will propagate until it reaches the ends of the waveguide. For this study, we fabricated three different devices that filter 200GHz, 250GHz and 300GHz depending on their physical dimensions. We also prove that these frequency filters can be tunable. In addition, we demonstrate three innovative 3D printed devices that perform OR, AND, XOR logic operations at 130GHz. The operation principle of these logic gates consists of two input electromagnetic waves that interfere to produce a desired output amplitude. The geometries of the Terahertz logic gates are formed by a combination of rectangular waveguides. Each device is evaluated for four input combinations: "on/on", "on/off", "off/on" and "off/off", where "on/off" means coupled/non-coupled radiation in each input. The output of these operations is the amplitude of the terahertz radiation at the end of the device. Upon comparing the numerical simulations with the experimental measurements, we achieved very similar results. This opens future possibilities to integrate these components in order to build more complex photonic circuits. The four devices presented in this thesis were simulated using COMSOL Multiphysics and fabricated by Fusion Deposition Modeling. Subsequently, they were tested by terahertz time-domain spectroscopy. The results obtained in this thesis show that 3D printing technology is an efficient method to produce terahertz components that can be used in many areas such as telecommunication and for the fabrication of THz components for control and manipulation of THz waves.