

## ANTENNAS AND ABSORBING MATERIALS BASED ON GEOPOLYMERS

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Innovative dielectric materials based on geopolymers represent a cost-efficient and eco-friendly alternative to current materials used in electronics and electric engineering applications. Increasing interest has been drawn in recent years to the dielectric properties of geopolymers. It was previously shown that such geopolymer-based antennas can properly operate in a frequency band ranging from 300 MHz to 3 GHz. However, at later ages, they are dependent on the porosity and the density of the geopolymer. Different additives have also been added to geopolymer matrix to stabilize the properties. Geopolymers represent too an alternative for the design of broadband antennas and absorbing materials.

The objective of this work is to develop new geopolymer-based composites with dielectric properties suitable for these applications, keeping acceptable mechanical and thermal properties. For this purpose, different formulations based on metakaolin, alkaline solutions and additives were tested. The validation criterion was to have  $\epsilon$  and  $\tan \delta$  values between 2 and 3.3 GHz.

For antenna type materials, the type of metakaolin used had low effect on the dielectric characteristics, while the nature of the activating alkaline solution had a significant influence. For the absorbing materials, a non-ionic surfactant, a 12% carbon content with 75% purity graphite and mineral fibers were selected. The tests as a function of the humidity showed a reversibility of the dielectric properties. In addition, the usage properties (mechanical, thermal and temperature resistance) revealed that certain compositions could be retained.