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Design of frequency-tunable triple-mode filter based on ceramic substrate integrated waveguide**Soon-Soo Oh** and **Dong-Woo Kim**
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A novel triple-mode filter based on ceramic substrate integrated waveguide structure designed for compactness is proposed. The operating filter can be tuned from 1.8 GHz to 2 GHz by adjusting the capacitance at the tuning point from 6 pF to 2 pF. For the triple-mode, the circular cylindrical cavity has been constructed in the form of the substrate integrated waveguide (SIW) structure since it could be made to be easy in a low cost. The thickness of the substrate is 10 mils and the dielectric constant is 2.2. The whole eight tuning points are placed inside the circular cavity. Each tuning point has a thru-hole connected to the other side conductor and has four variable capacitors. The diameter of the via is 0.8 mm. This design has one TE_{011} mode and two orthogonally generated TM_{110} -similar modes, and the mode characteristics of the proposed filter are analyzed using a full-wave electromagnetic (EM) simulation. The frequency variation was verified using the eigenvalue simulation embedded in EM simulator.

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Nanotechnology: General and biomedical applications**Tatiana B Tennikova**
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Nanotechnology represents the most important issue in the development of different scientific and practical fields. For example, the urgent task of modern care of public health is developing completely brand-new, "smart" drug formulations that can provide a superior therapeutic efficacy with minimum side effects. Moreover, the research in this direction might be able to achieve the unexpected decisions when choosing therapy for various, including widespread and extremely dangerous, diseases. In particular, biodegradable nano-containers with stipulated physical and chemical, as well as biological (biomimetic) properties of surface, which smoothly invaded in the natural processes of the human body, enable to provide such results. Thus, special attention is paid to the application of nano-technology to biology, biotechnology and medicine. The problems of the creation of carefully designed smart biomaterials and nanodevices will be discussed using the examples of the projects realized in the presenting department. The perspectives of nano-approaches in biomedicine will be demonstrated.

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