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Guest Editorial

Microwave Absorbing Materials

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The 4th Prof. Vijaya Agarwala Memorial National Symposium on Microwave Absorbing Materials (VAMMAM-2020)" was held during 23rd - 24th, August 2020 at Indian Institute of Technology Roorkee in association with Centre of Nanotechnology and Common Research Technology Development Hub (CRTDH) for New Materials/Stealth Applications and Department of Applied Mechanics Motilal Nehru National Institute of Technology Allahabad, Prayagraj, India.

In the times when the world is facing pandemic, the VAMMAM 2020, for the first time, was held in online mode. Some persistent participants have been returning every time and also helping with the technical aspects of the program. Some others have been first-time participants. Since the first edition of the VAMMAM, we have been sharing the state-of-the-art progress of microwave absorbing materials and techniques for the stealth as well as civilian applications with our fellow researchers. As the years progressed, papers and presentations contributed to this symposium have been increasingly encompassing the interdisciplinary efforts in the research work of Materials Science and Electronics Engineering.

For reaching to the broader audience, we are pleased that Defence Science Journal (DSJ) has agreed to publish the selected paper of VAMMAM 2020 in their esteemed journal as a special issue. I would like to highlight some of the major findings presented in the papers.

In the first paper, waste computer printed circuit boards (PCBs) are used for the absorption of microwaves. Authors have chosen this host due to its ease of availability, low density, easy handling, and cost-effectiveness. Their permittivity and permeability values are measured from 2 to 18 GHz frequency range using transmission line technique. Further, the authors have used multi-layering technique to enhance the bandwidth of the single-layer absorbers.

In the next study, room temperature rolling and cryorolling has been carried out on 304 L austenitic steel for various thickness reduction. Both rolling methods resulted in improved strength and hardness. Ultimate tensile strength increased by 115% for room temperature rolled specimen and 149% for cryorolled specimen after 90% thickness reduction.

In another work, pure and Co-doped TiO2 nanoparticles are prepared by the chemical precipitation method suitable for dielectric and electronic applications.

A multiple ring-CSRR based planar RF sensor has been designed and validated with the help of numerical model for characterisation of unknown water samples of varying TDS values. The proposed sensor is very simple and can be easily manufactured using PCB based fabrication technology.

A compact wideband with CPW feed antenna has been designed and simulated with the cubical-shaped phantom and cubical the shaped tumor cell inside the phantom. In simulation different type of scenarios has been considered such as different permittivity, conductivity, the size of cubical shaped tumor, and presence/absence of tumour. The authors have claimed results showing good matching of the sensor with the breast phantom and can be vital for the microwave imaging system.

In another paper, the authors have presented the design and experimental validation of a multiband and single-layered absorber comprised of eight sectors loaded circle inside the square.

The multi-axial compression process was successfully applied on AlMgSi alloy for up to three cycles. For AlMgSi alloy, the corrosion rate increased for the as-received sample to the 3rd cycle sample. The authors have explained this by enhanced dissolution of the matrix due to increase in local galvanic cells formed by grain reduction that resulted from multi-axial compression processing.

In the last paper, a real time experimental analysis of Through-wall Imaging (TWI) has been carried out by the authors using the TWI radar system to collect and process the data, with and without targets. The collected data is trained by a neural network for shape identification of targets behind the wall in any orientation and then threshold by a curve-fitting method for smoothing the background.

I extend my gratitude to DSJ and all the participants of VAMMAM-2020 and would extend my sincere thanks to one and all on behalf of the organising committee.

We are hopeful that this special issue will be a collection of informative papers which will play a pivotal role in the works of the researchers working in the similar fields.