

**THE 1<sup>ST</sup> INTERNATIONAL  
CONFERENCE ON ADVANCED AND  
MULTIFUNCTIONAL MATERIALS  
(ICAMM'24)**

**ABSTRACTS & PROGRAM**

*Ho Chi Minh City, Vietnam  
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# **CONFERENCE INFORMATION**

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**ORGANIZERS**

**Vietnam National University Ho Chi Minh City,  
Vietnam**

**Vietnam National University Ho Chi Minh City,  
University of Science  
VNUHCM - University of Science  
Faculty of Materials Science & Technology**

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**MULTIFUNCTIONAL RECONFIGURABLE VANADIUM DIOXIDE  
INTEGRATED METASURFACE FOR TERAHERTZ REGION**

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**Abstract:** Integrating reconfigurable and diverse functionalities into a single metasurface at terahertz (THz) frequencies is a rapidly growing research area though it presents significant challenges. In this work, a reconfigurable THz metasurface is proposed, offering diversified functionalities based on the phase transition of vanadium dioxide (VO<sub>2</sub>). The proposed metasurface can switch from wideband reflection to wideband cross-polarization conversion (CPC) and asymmetric transmission (AT) for linearly polarized waves. When VO<sub>2</sub> is in its metallic phase, the metasurface effectively reflects incident waves from 0.2 to 2.8 THz, achieving a total reflection above 0.8. In its insulating phase, the metasurface demonstrates near-perfect wideband CPC, with efficiency exceeding 0.99 between 0.46 and 2.67 THz, and an excellent AT effect, with efficiency greater than 0.9 from 0.65 to 2.29 THz for normal incidence of linearly polarized waves. These effects are preserved across a broad range of incident angles. The proposed switchable metasurface with diverse functionalities is expected to enable cutting-edge research and innovative applications in the THz region.

*Keywords:* *Multifunctional, Metasurface, Polarization conversion, Reflection*