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## Advanced Microwave Dielectric Materials

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### Message from the Guest Editor

The evolution of wireless communication systems necessitates advancements in microwave dielectric materials. Traditionally, these materials focused on temperature-stable ceramics with high relative permittivity for 2G and 3G base stations, and metallised ceramic rods for 4G filters. However, 5G and forthcoming 6G systems demand ceramics with low permittivity and near-zero temperature coefficients. Currently, microwave dielectrics serve as base station filters, while handheld devices employ acoustic wave filters. Yet, there's a pressing need for cost-effective antennas and low permittivity dielectrics to enhance efficiency and bandwidth. Polymers and ceramic-filled polymers emerge as viable options, offering cost-effectiveness and integration with established processes. However, ceramics retain advantages like lower dielectric losses, stable permittivity, and wider range of values, along with superior thermal and mechanical properties. Future materials such as magnetic oxide circulators, ceramics in polymer matrices, and GaN-on-diamond are anticipated to enter the wireless communication domain.



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**Special** Issue



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