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## Characteristics of Microwave Heating

3.2.1 Penetrating Radiation; 3.2.2 Rapid Heating; 3.2.3 Controllable Field Distributions; 3.2.4 Selective Heating of Materials; 3.2.5 Self-limiting Characteristic; 3.2.6 Microwave Effects; 3.3 Types of Microwave Heating; 3.4 Future Developments; 3.5 Summary; References; Microwave Heating of Metal-Based Materials; 4.1 Microwaves and Metals; 4.2 Observations and Theories-Mechanisms Proposed for Microwave Heating of Metals; 4.2.1 Size and Morphology of Starting Materials; 4.2.2 Effect of Separate Electric and Magnetic Fields; 4.2.3 Sintering Behavior and Mechanisms; 4.2.4 Proposed Microwave Sintering Model by Luo et al.; 4.2.5 Proposed Microwave Sintering Model by Rybakov et al.; 4.2.6 Model for Microwave Heating of Metal Compacts; 4.3 Microwave Sintering of Metals; 4.3.1 Cermets; 4.3.2 Ferrous Alloys; 4.3.3 Copper Alloys; 4.3.4 Aluminum and Composites; 4.3.5 Magnesium and Composites; 4.3.5.1 Microwave Sintering of Magnesium Composites; 4.3.5.2 Effect of Microwave Heating Rate on Properties of Pure Magnesium; 4.3.6 Tungsten Alloys; 4.3.6.1 Effect of Particle Size Distribution and Phases on Densification; 4.3.6.2 Effect of Sintering Atmosphere on Densification; 4.3.6.3 Effect of Aspect Ratio of Samples on Densification; 4.3.6.4 Comparison of Sintering Methods on Densification; 4.3.6.5 Microwave Sintering of Nanocrystalline Tungsten Powders; 4.3.7 Tin-Based Alloys (Electronic Solders); 4.3.8 Hybrid Composites; 4.3.9 Layered Composites; 4.4 Other Applications for Microwave Processing of Metals; 4.4.1 Microwave Melting; 4.4.2 Microwave Steel-making; 4.4.3 Heat Treatment and Annealing; 4.4.4 Diffusion Coating; 4.4.4.1 Microwaves and Aluminization; 4.4.4.2 Microwaves and Chromization; 4.4.4.3 Microwaves and Boronization

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### Sommario/riassunto

Using microwaves to treat metal-based materials is rapidly emerging as an energy-efficient tool to interact with metals for a number of processes such as sintering, melting, brazing, carburizing and annealing. Microwaves can sinter a wide variety of metal compacts with comparable or enhanced end properties, while at the same time delivering tremendous energy savings over conventional sintering. Microwave processes are therefore gaining increasing attention and adoption in both academia and industry. Gupta and Wong have written this comprehensive text to introduce readers to the world of micr

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