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Application of Barkhausen noise and ferromagnetic hysteresis for magnetic non-destructive evaluation of multiphase composites and structures NEELAM PRABHU GAUNKAR, ORFEAS KYPRIS, CAJETAN NLEBEDIM, DAVID JILES, Department of Electrical and Computer Engineering, Iowa State University — Composite ferromagnetic materials with multiple magnetic phases are increasingly being used in applications such as magnetic data storage, magnetic sensors and actuators and exchange-spring magnets. These materials occur in single or multiphase conditions and can undergo phase changes over time or during processing. For these materials, we examine the interrelation between ferromagnetic hysteresis, Barkhausen noise and the material microstructure. We observe that the presence of a second phase in these materials can be detected with the help of Barkhausen noise signals due to the occurrence of additional peaks in the magnetization envelope. This behavior in the magnetic response can serve as a tool for non-destructive evaluation of ferromagnetic materials for which phase constitution and phase changes affect the structural performance.

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