

Phase Separation in Proton-Irradiated Graphite

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Detailed nature of magnetism and defects in proton-irradiated graphite has been revealed by our electron spin resonance measurements. Proton irradiation creates defect regions confined and imbedded in the graphite background, consisting of a central part of itinerant spins and an outer part of localized, magnetically correlated spins. Our results indicate that proton-irradiation creates confined defect regions of a metallic island surrounded by an insulating magnetic region which “isolates” the metallic island inside from the metallic graphite background outside. We have thus come up with a picture of phase separation in proton-irradiated graphite comprising three regions of distinct electrical and magnetic properties. In effect, an illuminating phase separation picture was addressed in this work, involving two metallic regions “insulated” by a magnetic region in between.