

The change of magnetic relaxation in the neutron irradiated N-Cr-Mo steel

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The change of magnetic properties due to neutron irradiation has a potential possibility in the application of nondestructive evaluation of nuclear power plant[1, 2]. In this work, the change of the hysteresis loop and the permeability spectra due to neutron irradiation was investigated on broken Charpy specimens of A508 Class 2 pressure vessel steel weldments which were exposed to irradiation levels of $1.228 \times 10^{19} \text{ n/cm}^2$ and $3.94 \times 10^{19} \text{ n/cm}^2$. The saturation magnetization slightly decreased, but the coercivity increased by 16% in the 3.94 n/cm^2 irradiated sample. The permeability decreases with neutron dose, while relaxation frequency increases. These results can be interpreted on the basis of a variation of the extent of domain wall pinning, as manifested in changes in the spring constant α , increasing with neutron dose.

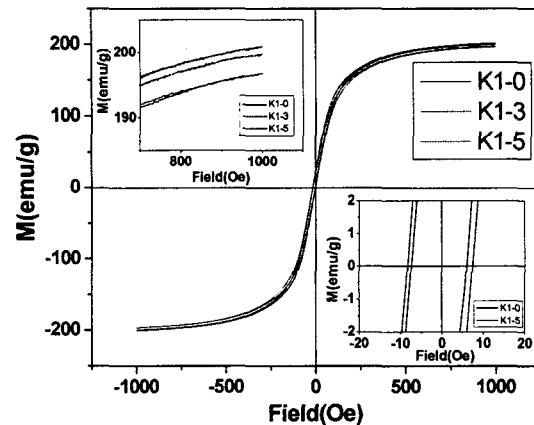


Fig.1. The hysteresis loop for three investigated samples; K1-0: unirradiated, K1-3 and K1-5 are samples irradiated with the dose of $1.22 \times 10^{19} \text{ n/cm}^2$ and $3.94 \times 10^{19} \text{ n/cm}^2$, respectively

References

- [1] D.S. Drinon, P.K. Liaw, R.D. Rishel, M.K. Devine and D.C. Jile, Serviceability of Petroleum, Process, and Power Equipment, PVP-vol. 239/MPC-vol.33, ASME 1992.
- [2] D.G. Park, J.H. Hong, I.S. Kim, H.C. Kim, J. Mat. Sci. 32, pp. 6141-6146, 1997.