

Print

STRAIN DEPENDENCE OF EXCHANGE INTERACTIONS  
IN DILUTE PdFe ALLOYS AND IN PURE Pd

by

E. Fawcett, D. B. McWhan, R. C. Sherwood  
Bell Telephone Laboratories, Incorporated  
Murray Hill, New Jersey

and

M. P. Sarachik\*  
City College of CUNY  
New York, New York

We have measured the magnetostriction and the pressure dependence of the Curie temperature<sup>1</sup> in dilute ferromagnetic alloys of Fe in Pd, and find that the magnetization decreases with volume, whereas the Curie temperature increases with volume. Theoretical considerations show that these results are consistent and that each provides independent evidence of a positive strain-dependence of the "s-d" exchange interaction between the conduction electrons and the magnetic moments associated with the Fe atom. In our analysis we employ the experimental value of the magnetostriction in pure Pd.<sup>2</sup> The relatively small value of the latter indicates that the exchange interaction responsible for the enhancement of the spin susceptibility in paramagnetic Pd has a negative strain-dependence, like the exchange interaction in ferromagnetic Ni,<sup>3</sup> and in contrast with the s-d exchange interaction in the dilute ferromagnetic PdFe alloys.

---

\* Supported by Air Force Office of Scientific Research, Office of Aerospace Research, under Grant AFOSR 894-67