Extracting the diffusivity ratio from point contact Andreev reflection spectroscopy and upper critical field measurements in MgB2

Abstract

The di®usivity ratio ´, which measures the relative intraband scattering in the ¼ and ¾ bands in MgB2 has been determined by ¯tting the Hc2(T) at T » Tc and by Point Contact Andreev Re°ection. We ¯nd a satisfactory agreement between the values for ´ obtained by both methods for c-axis orientated MgB2 thin ¯lms. Point contact Andreev Re°ection was then applied to bulk MgB2 containing Mg vacancies. Spectra obtained in zero ¯eld indicate a distribution of the two gaps ¢¾;¼ but no merging of the values with increased magnesium de¯ciency. Spectra ¯tted as a function of ¯eld are consistent with an increase in ¼ intraband scattering with increasing magnesium de¯ciency. Measurement of the point contact Andreev re°ection spectra as a function of temperature revealed features not immediately expected from current theoretical models.