Figure 5 shows the FMR absorption plot of the best sample, Y20, i.e. the variation of the scattering S-parameter (S_{21}), which is the transmission of microwaves across the sample, as a function of the intensity of the applied magnetic field (B_a). The graph presents a number of satellites to the main FMR resonance peak: these occur at applied fields both greater and less than the main FMR peak and are due to the orientation of the RF excitation field relative to the DC applied field, causing magneto-static modes to be setup [25,26].

4. Conclusion

We have reported the growth of high-quality μm-thick YIG films on YAG substrates by PLD: the films are epitaxial, with the same orientation of the substrate. Compared to YIG films deposited on GGG under the same conditions, YIG/YAG samples feature a narrower FMR linewidth, which suggests that lattice mismatch has a positive effect on the magnetic properties of the YIG films; the mechanism by which the lattice-mismatch causes better magnetic properties has been explained through strain-relief by misfit dislocation and by TEC-mismatch. Substrate temperature and oxygen pressure were optimized at the following values: $T \approx 1600$ K and $P_{O2} \approx 1$ Pa respectively, which allowed us to reach a value of FMR linewidth as low as $\Delta H = 1.75$ mT at $f = 6$ GHz. New multi-PLD experiments are currently in progress to further tune composition and magnetic response of the films by simultaneous ablation of Fe_2O_3 and YIG targets.

Acknowledgments

The research was funded by the Engineering and Physical Sciences Research Council (EPSRC). Grants: EP/F019300/1, EP/G060363/1.

The authors would like to thank Dr. Kate Sloyan in the PLD research group of the Optoelectronics Research Centre of the University of Southampton for discussion and help with PLD, Dr. Mark E. Light in the University of Southampton School of Chemistry for his help with XRD analysis.