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Untangling the contributions of cerium- and iron- sublattices to the magnetism of Ce-doped yttrium iron garnet. GERVASI HERRANZ, BLAI CASALS, MARINA ESPINOLA, RAFAEL CICHELERO, JOSEP FONTCUBERTA, Institut de Cincia de Materials de Barcelona ICMAB-CSIC, Campus UAB, 08193 Bellaterra, Spain, STEPHAN GEPRAGS, MATTHIAS OPEL, RUDOLF GROSS, Walther-Meiner-Institut, Bayerische Akademie der Wissenschaften, 85748 Garching, Germany — The remarkable magnetic properties of yttrium iron garnets (YIGs) underpin the use of these materials in a broad scope of spintronic and photonic applications. In particular, the addition of rare-earth metals in the structure enhances to a great extent the magneto-optical activity, which is beneficial for the development of nonreciprocal devices for communication along optical fibers. Yet, the physical mechanisms that lead to the observed enhanced gyrotropic response of doped YIG are not fully unveiled. Here we present a methodology based on magneto-optical spectroscopy that may be instrumental to better understand the optical response of these materials. In particular, we have exploited the wavelength selectivity of magneto-optics to identify a range of frequencies at which one can unravel the individual contributions to the magnetism and gyrotropic response arising from the individual cerium and iron sublattices. The approach outlined here paves the way to assess quantitatively the effect on the optical properties of rare-earth incorporation into YIG, providing an instrumental methodology towards tailoring the functional properties of YIG.

Gervasi Herranz
Institut de Cincia de Materials de Barcelona ICMAB-CSIC, Campus UAB, 08193 Bellaterra, Spain

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