

Supplementary material

A new physical simulation tool to predict the interface of dissimilar aluminum to steel welds performed by Friction Melt Bonding

T. Sapanathan^{1,*}, N. Jimenez-Mena¹, I. Sabirov², M.A. Monclús², J.M. Molina-Aldareguia², P. Xia^{2,3}, L. Zhao¹, A. Simar¹

¹ Institute of Mechanics, Materials and Civil Engineering, UCLouvain, 1348 Louvain-la-Neuve, Belgium

² IMDEA Materials Institute, Calle Eric Kandel 2, 28906 Getafe, Madrid, Spain

³ Universidad Politécnica de Madrid, E.T.S. de Ingenieros de Caminos, 28040 Madrid, Spain

* Corresponding author e-mail: thaneshan.sapanathan@uclouvain.be

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Fig. S1: IPF maps of FMB100 and GB100 samples

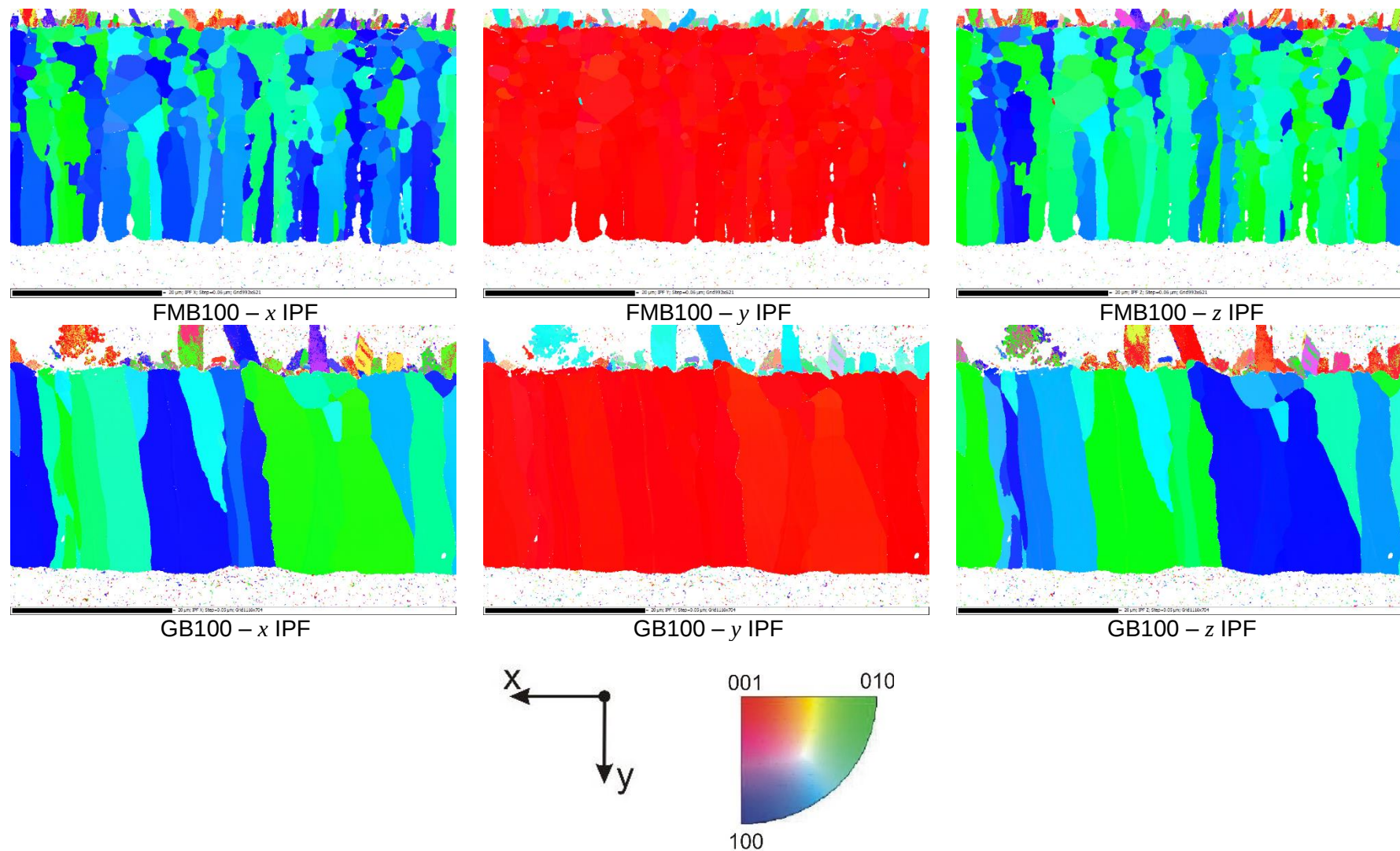


Fig. S1. Comparisons of IPF maps obtained for x,y,z direction for both FMB100 and GB100 samples. The scale bar is equal to 20μm.

Fig. S2: IPF maps of FMB200 and GB200 samples

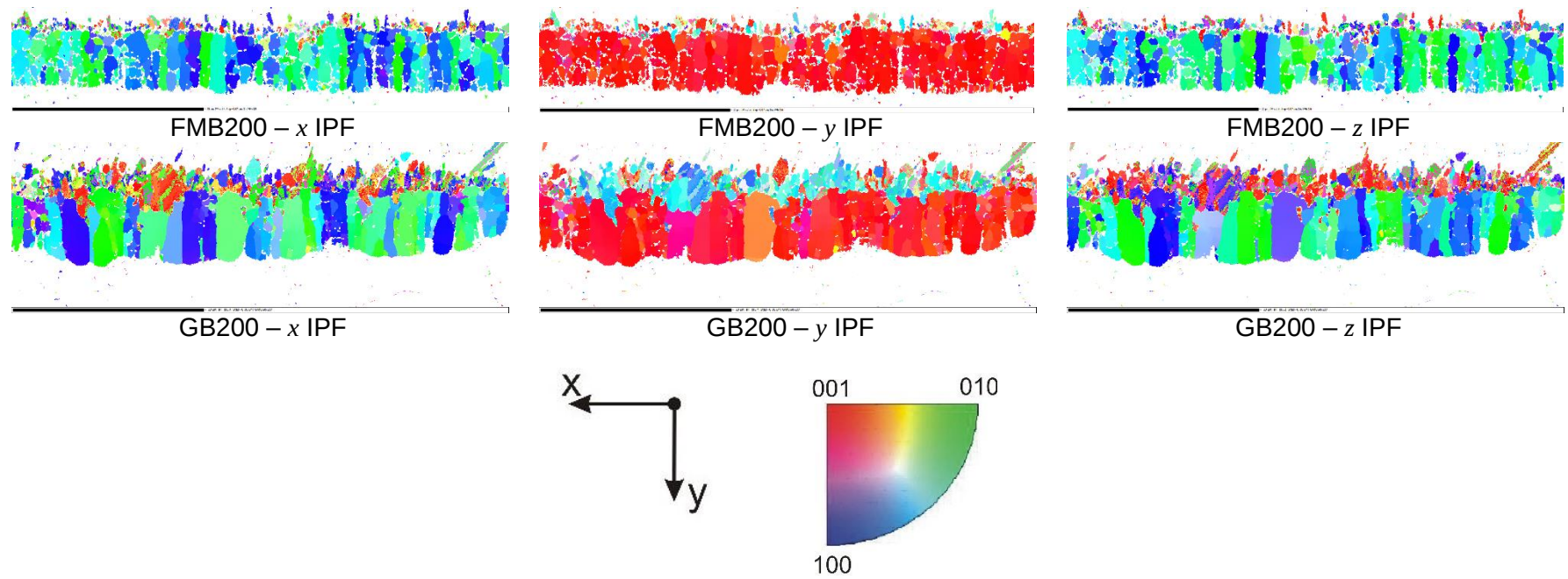


Fig. S2. Comparisons of IPF maps obtained for x,y,z direction for both FMB200 and GB200 samples. The scale bar is equal to 20 μ m.

Fig. S3: Phase maps of FMB100, GB100, FBM200 and GB200

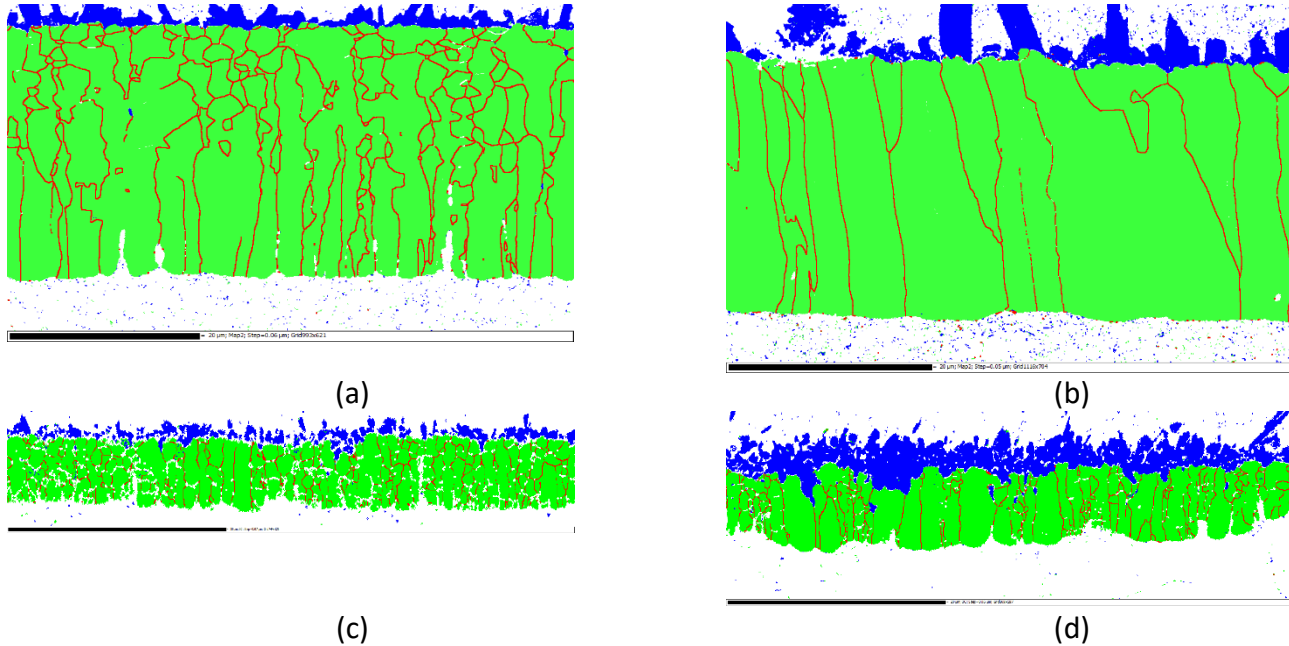
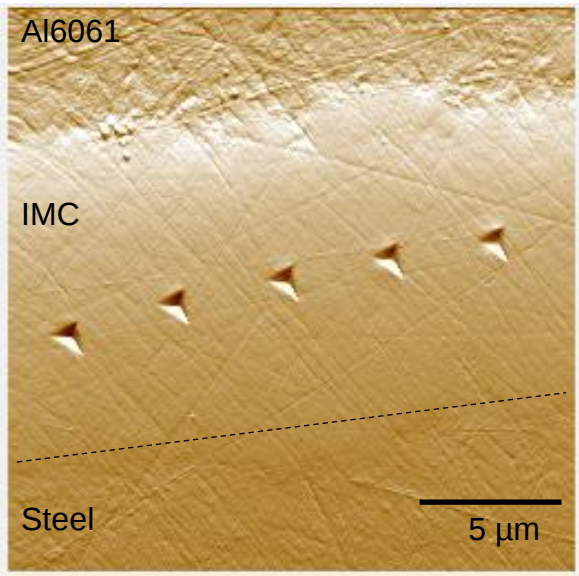
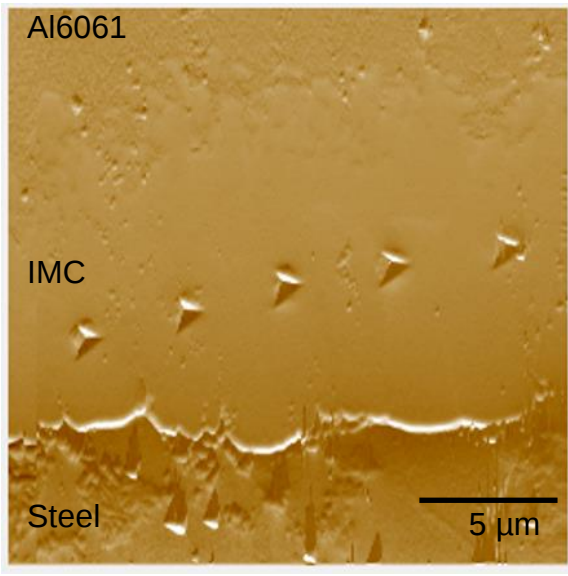


Fig. S3. Phase maps obtained from EBSD for samples: (a) FMB100, (b) GB100, (c) FMB200 and (d) GB200. Blue and green represent $\text{Fe}_4\text{Al}_{13}$ and Fe_2Al_5 , respectively. High angle grain boundaries (misorientation angle $>15^\circ$) in Fe_2Al_5 phase are marked with red lines. The scale bar is equal to 20 μm

Fig. S4 – Nanoindentation results from FBM200 and GB200



FMB200



GB200

Sample	Hardness (GPa)	Reduced modulus (GPa)
FMB200	11.2 ± 0.2	187.5 ± 2.0
GB200	11.5 ± 0.2	188.6 ± 2.0

Fig. S4. Comparison of nanoindentation tests performed along the lines parallel to the interface inside the IM bonding layers of the FMB200 and GB200 samples. Scanning probe microscopy (SPM) images show the indentation imprints left on both IM layers for FMB200 and GB200 samples. The table below the SPM images indicate the average values of nanohardness (GPa) and reduced elastic modulus (GPa) obtained at the IM region in both FMB200 and GB200 samples.