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Photoemission Studies on Bulk Amorphous Steels MICHAEL BUETTNER, University of Virginia, Materials Science & Engineering, B. SIMON MUN, Advanced Light Source, Lawrence Berkeley National Laboratory, PETER OELHAFEN, University of Basel, Institute of Physics, PETRA REINKE, University of Virginia, Materials Science & Engineering — The recent availability of bulk amorphous metals (BMGs) promises interesting new applications for the near future based on the superior structural, physical, and chemical properties of such materials compared to conventional steels. In order to shed light on local atomic and electronic structure photoemission studies have been performed on BMGs containing Fe, Cr, Mo, C, B, and Er. Progressing from ternary to penternary alloys we studied changes in the local electronic environment in a systematic manner by means of core-level and valence band spectroscopy. Step-by-step ion irradiation revealed differences in surface and bulk elemental composition and bonding. In particular the bonding state of B changes from oxide (surface) to boride (bulk). Iron exhibits the most prominent spectral changes of all the metal constituents, showing significantly higher core-level binding energies in penternary alloys than in ternary and quaternary compounds. Investigations of the Fe 3s multiplet splitting indicates a dependence of the splitting energy on the abundance of erbium in the alloy. Future experiments will focus on bulk material properties by preparing alloy surfaces in vacuum and addressing the constituents' chemical environment in more detail.

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