statistics on the strain measurements were systematically investigated. For the t-joint configuration two dimensional stress maps were calculated from the data. For the near future an in-situ FSW experiment is planed to investigate the metallophysical processes during the welding.

MM 23.23 Tue 14:45 Poster B

Field-driven evolution of stripe domains in magnetic shape memory alloy films — Nikolay S. Kiselev[1,2], Igor E. Dragunov[2], Aristide T. Onisan[1], •Ulrich K. Rössler[1], and Alexei N. Bogdanov[1,2] — [1]IFW Dresden — [2]Donetsk Institute for Physics and Technology

A phenomenological approach is used to describe the redistribution of martensitic variants driven by an external magnetic field in ferromagnetic shape memory materials. Real samples of magnetic shape memory alloys as the Ni-Mn-Ga Heusler alloys contain complex systems of crystallographic and magnetic domains [1, 2]. Magnetic reversal in such system is characterized by particular effects including the existence of 180-degree magnetic domain structures within the twin variants and the rotation of magnetic moments within magnetic domains in case of relatively weak magnetic anisotropies [1]. An elementary model for these complicated systems is proposed by using the "one-to-one correspondence" between magnetic domains and martensite variants [3]. For this model, we calculate stability ranges and evolution of equilibrium and metastable stripe states [3] and isolated twin-variants in thin single-crystalline plates. We discuss the applicability of this model to describe nucleation and magnetization processes in real samples.

[1] Y. W. Lai et al., Appl. Phys. Lett. 90 (2007) 192504; [2] V. A. Chernenko et al., Acta Mater. 53 (2006) 5461. [3] N. S. Kiselev et al., Eur. Phys. J. Special Topics, to appear.

MM 23.24 Tue 14:45 Poster B

Dependency of magnetic domain structures on stress and field history in bulk NiMnGa — •Ryan Yiu Wai Lai, Jeffrey McCord, Rudolf Schaefer, and Ludwig Schultz — Leibniz-Institute for Solid State and Materials Research, P.O.Box 270116, Dresden D-01171, Germany

A study of the magnetic domain structure in bulk NiMnGa magnetic shape memory single crystals is presented. Polarization microscopy, using a magneto-optical indicator film technique, is employed to obtain the static magnetic domain patterns at all surfaces of bulk crystals. Different complexity of domain patterns is revealed with different twinning states (e.g. single variant state, two-variant state). The dependency of domain patterns with stress and field history is investigated. Domain models explaining the observations will be discussed in detail. Funding through the DFG priority program SPP1239 is gratefully acknowledged.

MM 23.25 Tue 14:45 Poster B

Micromechanics of thin films of elastomeric polypropylenes — •Mechthild Franke, Mario Zerson, Mario Jecke, Robert Magerle, and Nicolaus Rehse — Chemische Physik, TU Chemnitz, 09107 Chemnitz

Elastomeric polypropylene consists of lamellar crystals embedded in an amorphous matrix. The arrangement, distribution, and connectivity of these crystals are important factors which determine the mechanical properties of the polymer. Free standing, $\sim$1 μm thick films of different elastomeric polypropylenes are produced by dip coating the polymer solution on a NaCl crystal, floating the film onto water, and depositing it on a slotted silicon substrate. A stretching device, based on a piezoelectric drive, allows stretching the free standing film stepwise up to strains of 100%. The changes in shape, orientation, and morphology of crystalline regions are observed in situ with scanning force microscopy. Caused by the induced stress new lamellae crystallize; existing ones elongate or break into blocks. Furthermore, amorphous areas are stretched a lot more than crystalline ones. Volume images of thin films obtained with SFM based Nanotomography allow to explain some of the observed rearrangements of the microstructure.

MM 23.26 Tue 14:45 Poster B

Aktuelle Forschung an der Bonner Positronen Mikrosonde — •Sven-Martin Hühne, Marius Wirtz, Patrick Eich, Matz Haaks und Karl Maier — Helmholtz-Institut für Strahlen- und Kernphysik, Universität Bonn, Nussallee 14-16, D - 53115 Bonn

Die Bonner Positronen Mikrosonde (BPM) ist derzeit ein einzigartiges Messinstrument, das mit Hilfe der Positronenannihilation zerstörungsfrei die Defektdichte in Metallen und Halbleitern in hoher Ortsauflösung messen kann.

Die BPM bietet einen fein fokussierten Positronenstrahl mit einstellbarem Stahldurchmesser von 5 - 200 μm und ein integriertes Rasterelektronenmikroskop (REM). Dadurch ist es möglich mit der BPM mit hoher lateraler Auflösung Plastizität und Defektdichte in verschiedenen Materialien zu messen.

Aktuelle Forschungsschwerpunkte liegen in der Abbildung von Deformationszonen und Ermüdungsstrukturen. Des Weiteren werden die Ergebnisse der durch Positronenannihilation gemessenen Defektdichte mit den klassischen Methoden zur Bestimmung der Schädigung wie Röntgen-Beugung (Debye-Scherrer Methode) und Vickers-Härte Messungen verglichen. Die in den Abbildungen erkennbare Entwicklung der Fehlstellendichte wird zur Vorhersage des Materialversagens in der Deformationszone herangezogen. Es zeigt sich, dass die Untersuchung der Defektdichte zu einer präzisen Schadensvorhersage führt, wie sich an aktuellen Messungen von Ermüdungsstrukturen an ferritischem und austenistischem Stahl veranschaulicht hat.

MM 23.27 Tue 14:45 Poster B

Introduction of Slip System Resolved Statistical Work Hardening Model — •Denis Novokshanov and Volker Mohles — Institute of Physical Metallurgy and Metal Physics, RWTH Aachen Kopernikusstr. 14, D-52074 Aachen, Germany

A slip system resolved statistical work hardening model for single crystals has been developed. It is based on the dislocation density-based work hardening model 3IVM+, which in turn is an improved version of the 3IVM (three internal variables model) [1]. 3IVM+ predicts stress-strain curves for large ranges of temperature and strain rate. In the new model, the microstructure evolution of 3IVM+, i.e. the dislocation density evolution, is left unchanged. But the kinetic equation of state of 3IVM+ has been inverted: the new model considers the glide velocity of dislocations as a function of temperature and the external applied stress. This allows to consider each glide system individually by applying the corresponding Schmid factor in the stress projection. Hence all slip systems contribute to the overall deformation according to their intrinsic kinetics, which is defined by the crystal's orientation and the load axis. This leads tho realistic stress-strain curves and orientation changes for a single crystal. The model can be used as a replacement for 3IVM(+) in engineering applications of FEM. For polycrystals, the interaction between grains can be introduced in future by elastic stresses caused by differing rotations of adjacent grains.

1. F. Roters, D. Raabe, G. Gottstein, Acta Materiallia 48 (2000) 4181-4189

MM 23.28 Tue 14:45 Poster B

$Pd_{81}Si_{19}$-Metallic Nanoglasses with Enhanced Excess Volume — •Yue Zhang, Horst Hahn, and Herbert Gleiter — Institute of Nanotechnology, Forschungszentrum Karlsruhe, Germany

$Pd_{81}Si_{19}$ metallic nanoglasses were synthesized by inert gas condensation and in situ compaction. In this technique, amorphous nanoparticles, prepared by evaporation in an inert gas atmosphere, are collected and subsequently compacted using uniaxial pressures. During the compaction, surfaces are converted into internal interfaces and additional free volume is introduced into the amorphous structure. Wide angle X-ray diffraction and high resolution electron microscopy are employed to characterize the atomic structure. The excess volume fraction was calculated using classical free-volume theory from differential calorimetric scanning data. In order to have a comparison, glassy ribbons and bulk metallic glass rods with the same chemical composition were prepared using melt-spinning and B_2O_3 flux casting techniques, respectively. Comparing with these conventional metallic glasses, the $Pd_{81}Si_{19}$ nanoglasses exhibit an enhanced excess volume, resulting in modified properties.

MM 23.29 Tue 14:45 Poster B

The Grain Refinement in a Commercial Al-Mg-Sc-Zr Alloy during Hot ECAP and Subsequent Isothermal Rolling — •Olga Sukhopar[1], Oleg Sitdikov[2,3], Günter Gottstein[1], and Rustam Kaibyshev[4] — [1]Institute of Physical Metallurgy and Metal Physics, RWTH, Aachen 52074, Germany — [2]Institute for Metals Superplasticity Problems, Ufa 450001, Russia — [3]Department of Engineering Physics, Electronics and Technology, Nagoya Institute of Technology, Nagoya 466-855, Japan — [4]Belgorod State University, Belgorod 308034, Russia

Grain refinement taking place in a commercial Al-Mg-Sc-Zr alloy under equal channel angular pressing (ECAP) and subsequent isothermal rolling, which were carried out at a temperature of 325°C, was exam-