Microstructural Evolution And High Strain Rate Mechanical

Eventually, you will very discover a additional experience and feat by spending more cash. yet when? accomplish you receive that you require to get those all needs like having significantly cash? Why don't you attempt to acquire something basic in the beginning? That's something that will lead you to understand even more in the region of the globe, experience, some places, once history, amusement, and a lot more?

It is your no question own mature to work reviewing habit. in the middle of guides you could enjoy now is **microstructural evolution and high strain rate mechanical** below.

The 10 BEST Cannabis Strains! As Voted for by You ??? *5 Tastiest Strains of CANNABIS! 13 Budtenders Tell Us Their Favorite Cannabis Strain | Ask A Budtender* 5 Most Popular Strains of Cannabis! Here's an Easy Trick to Find the Perfect Sativa Strain for You | The Hit List *Lecture 19: Theory of deformation texture evolution Mixing Cannabis to Create the Perfect Strain!* Weed Has a Seriously Mysterious Genetic History | MERRY JANE News Book Review | The Andromeda Strain vs. The Andromeda Evolution Embracing Organics Live Show With special guest Mass Medical Strains Indica vs Sativa? Does it even matter? Differences between Indicas, Sativas, Ruderalis, and hemp

---

Funeral Home Secrets They Don't Want You To Know*Could The US Defend From An Invasion of the Homeland* Differences between SATIVA vs INDICA *Biggest Mistake Consumers Make | Ask A Budtender* ~~The TRUE DIFFERENCE Between a Cannabis Sativa, Indica, and Hybrid Plant~~ *Man From a Country That Doesn't Exist* Why Prisons Ban These Everyday Items Michael Crichton - The Andromeda Strain NASA Science Live: Asteroid Close Approach The best marijuana strains for creativity and productivity (energizing sativa strains) *Lecture 33 : Superalloys (Contd.)* **Episode 7 - Gleeble Hot Rolling and TMCP Studies Favorite Strain of Cannabis: Indica, Sativa, Hybrid | KFNB S1:E08** *Microstructure evolution during* *multiaxial processing of Ti-6Al-4V* The Andromeda Strain by Michael Crichton | Audiobook *Lecture 31: Superalloys Top 10 Strains of All Time Michael Crichton's The Andromeda Evolution Trailer* ~~Microstructural Evolution And High Strain~~ Under high strain rates, plastic deformation can be assumed to be adiabatic, and a significant temperature increase can occur at large strains. In this study, shock-hardened polycrystalline copper was subjected to high strains (? ~ 5) at high strain rates (?? ~ 10 4 s ?1) using a stepped specimen in a Hopkinson bar. Microstructural analysis by transmission electron microscopy revealed that the highly deformed shear-band region consisted of a gradual decrease in grain size with ...

~~MICROSTRUCTURAL EVOLUTION IN HIGH STRAIN, HIGH STRAIN-RATE ...~~

To study the microstructural evolution in high-strain-rate shear deformation of Ti-5Al-5Mo-5V-1Cr-1Fe (Ti-55511) alloy, a series of forced shear tests of hat-shaped specimens have been conducted...

~~Microstructural Evolution in High-Strain-Rate Deformation ...~~

increases with increasing strain rate but decrease with increasing temperature. The microstructure observations confirm that the high strain rate mechanical behavior of the cobalt base superalloys specimens are directly related to the effects of the strain rate, temperature and the evolution of the microstructural texture.

~~Microstructural Evolution and High Strain Rate Mechanical ...~~
Microstructural Evolution during Heat Treatment and High Strain Rate Deformation of an Fe-10Ni-0.1C Steel By Ian Harding Master of Science, Brown University, Providence, RI, 2015 Bachelor of Science, Temple University, Philadelphia, PA, 2013 A dissertation submitted to the School of Engineering in partial fulfillment

~~Microstructural Evolution during Heat Treatment and High ...~~
Constructing processing maps is a widely used method to analyze the microstructural evolution of alloys during their high-temperature deformation, based on their stress–strain relationship. To construct the processing map of an alloy, a

dynamic material model (DMM) is required in order to predict the hot workability of the alloy , , .

~~High-temperature deformation behavior and microstructural ...~~
The local temperature increase during high strain-rate deformation can influence the local microstructural evolution, including precipitation and dynamic/mechanical recrystallization within a shear band. In the case of a low[18, 31] -carbon steel, a temperature

~~Temperature increases and thermoplastic microstructural ...~~
It was found that the evolution of microstructure and strain-hardening induced by plastic deformation were occurred in the subsurface. When the microstructure, hardness and

depth of the plastic deformation layer (PDL) reached a relatively steady state, the friction process transformed into stable-state stage.

~~Microstructural evolution and dynamic strain-hardening in ...~~
Comprehensive transmission electron microscopical studies have been conducted for solution-hardened steels deformed at high (1000s?1) and low (0.001s?1) strain rates, in order to clarify the...

~~(PDF) Microstructural evolution at high strain rates in ...~~
The microstructural analysis demonstrates that dislocation motion are main deformatin mode to accommodate dynamic tensile deformation at high strain rates. In addition, the

interactions of dislocation-dislocation and dislocation-second phase lead to the increase of flow stress and strain hardening with increasing strain rate.

~~Dynamic tensile properties and microstructural evolution ...~~
A higher strain rate usually offers strengthening by promoting dislocation and twinning kinetics. Meanwhile, the increase of temperature due to dissipative heating during high-strain-rate deformation results in softening. The microstructural evolution and the resulting mechanical properties depend on the competition between both effects [34,35].

~~Microstructural evolution of a nanotwinned steel under ...~~
The effect of elemental segregation on local hardness and

microstructural evolution introduced by high strain-rate deformation in a CrMnFeCoNi high entropy alloy was investigated. Mn and Ni elemental segregation to interdendritic boundaries occurs during the solidification process and is intensified by dynamic deformation.

~~Effects of elemental segregation on microstructural ...~~

The goal of this study is to understand how microstructural evolution at large strains leads to transitions in rheological behavior. The shear zone we investigated exhibits higher strain and greater localization than previously studied shear zones in the Josephine Peridotite.

~~Microstructural and Rheological Evolution of a Mantle ...~~

Microstructural evolution and FCC twinning behavior during hot deformation of high temperature titanium alloy Ti65. ... For the texture evolution with a strain of 0.4, the preferred orientation distribution is affected by the fragmentation and spheroidization behavior obviously. ... The high activation energy means more energy is needed to ...

~~Microstructural evolution and FCC twinning behavior during ...~~
The microstructural evolution is a strong function of various FSW process parameters that influence the thermal cycle. The recrystallized grain size is typically in the range of 1–10 µm. By carefully controlling the process parameters and/or tool size, it is possible to obtain bulk nanocrystalline materials.

~~Microstructural Evolution - an overview | ScienceDirect Topics~~
Higher strain rate leads to finer recrystallized grains. The material constants (?, n, A) and deformation activation energy (Q) are calculated by the regression analysis. The increase of strain caused the decrease of Q, indicating the DRX occurred more easily.

~~Study on microstructural evolution and constitutive ...~~
Microstructural evolution during DTE was verified by means of an EBSD analysis, which revealed that a strong dual <001> + <111> texture was developed regardless of the UFG and FG sizes. However, the UFG-B fragments exhibited that the <111> oriented fibers were replaced by the <001>

orientated fibers as a result of mDRX, while the <111> component fraction in FG-200 saturated without any extensive reduction.

~~Deformation and microstructural evolution of ultrafine ...~~
On the microstructural evolution pattern toward nano-scale of an AISI 304 stainless steel during high strain rate surface deformation.

~~J. Mater. Sci. Technol.~~
The deformation microstructures and texture at five strain levels were observed and characterized using transmission electron microscopy (TEM) and neutron diffraction. The microstructures evolved within a framework common to

medium and high stacking fault energy fee polycrystals.

~~Microstructural evolution in nickel during rolling from ...~~
Microstructural evolution in deformation zones corresponded to the variation of tensile stress–strain characteristics with temperature, reflecting the hardening or softening feature of matrix. Dynamic recovery ascribed to the flow softening of the composite at 700 °C, while flow softening is owing to dynamic recovery and DRX above 800 °C.

The microstructural evolution of alpha iron under tensile deformation at high temperature (T[subscript H]> 0.5) and slow strain-rate (10?5s?1 to 10?5s?1) was investigated. The impetus for this study was the recent observation of Dynamic Abnormal Grain Growth (DAGG) in pure molybdenum under the same testing conditions. A high temperature tensile testing system was refurbished and assembled for this study. The testing system consists of an Centorr 2229 furnace system mounted on an Instron 1331 load frame. I designed the tensile grip and programmed the testing program to obtain data in the stress and strain regime of interest. Testing were done at both UC Davis and Los Alamos National Labs (LANL). Metallography techniques and electron backscattering diffraction (EBSD) technique in a scanning electron microscope were used to characterize the samples after testing. In addition to normal tensile tests at constant strain-rates where DAGG is proposed to occur, a series of strain-rate change tests were designed and performed. Strain-rate change tests were employed to extract activation area information that provided insight into the active mechanism of deformation of the material in addition to the information obtained from analysis of the stress-strain curve and the microstructure via optical microscopy and EBSD. The obtained stress-train curve data were compared with the stress-strain curves data in the literature for alpha iron in similar regime of deformation indicating that the dominant mechanism of deformation is dynamic recovery. The comparison includes past stress-strain curves and the data recorded in the Ashby Map. Optical and EBSD analysis showed that normal grain growth occurred in alpha iron during this testing regime. This lack of grain boundary pinning by impurity differs from that observed in Mo that exhibited DAGG. Activation area analysis showed that the activation area values of Fe are consistent with friction drag from the lattice being the active deformation mechanism. The same activation area analysis reveals that the active mechanism of deformation in the Mo material that exhibited DAGG is impurity drag. These analyses reveal the microstructure evolution of pure alpha iron and provide thought about the difference between Fe and Mo. Although both Fe and Mo have a BCC structure and undergo dynamic recovery for the processing conditions considered, DAGG did not occur in pure Fe. Dynamic recovery and normal grain growth occurred in Fe instead; there was no grain boundary pinning.

Additive manufacturing (AM), also known as 3D printing, is a concept and method of a manufacturing process that builds a three-dimensional object layer-by-layer. Opposite to the conventional subtractive manufacturing, it conquers various limitations on component design freedom and raises interest in various fields, including aerospace, automotive and medical applications. This thesis studies the mechanical behavior of thin-walled component manufactured by a common AM technique, laser powder bed fusion (LPBF). The studied material is Hastelloy X, which is a Ni-based superalloy, and it is in connection to a component repair application in gas turbines. The influence of microstructure on the deformation mechanisms at elevated temperatures is systematically investigated. This study aims for a fundamental and universal study that can apply to different material grades with FCC crystallographic structure. It is common to find elongated grain and subgrain structure caused by the directional laser energy input in the LPBF process, which is related to the different printing parameters and brands of equipment. This thesis will start with the study of scan rotation effect on stainless steel 316L in an EOS M290 equipment. The statistic texture analysis by using neutron diffraction reveals a clear transition when different level of scan rotation is applied. Scan rotation of 67° is a standard printing parameter with intention to lower anisotropy, yet, the elongated grain and cell structure is still found in the as-built microstructure. Therefore, the anisotropic mechanical behavior study is carried out on the sample printed with scan rotation of 67° in this thesis. Thin-walled effects in LPBF are investigated by studying a group of plate-like HX specimens, with different nominal thicknesses from 4mm down to 1mm, and a reference group of rod-like sample with a diameter of 18mm. A texture similar to Goss texture is found in rod-like sample, and it becomes //BD fiber texture in the 4mm specimen, then it turns to be fiber texture along the transverse direction (TD) in the 1mm specimen. Tensile tests with the strain rate of 10?3 s?1 have been applied to the plate-like specimens from room temperature up to 700 ?. A degradation of strength is shown when the sample becomes thinner, which is assumed to be due to the overestimated load bearing cross-section since the as-built surface is rough.

A cross-section calibration method is proposed by reducing the surface roughness, and a selection of proper roughness parameters is demonstrated with the consideration of the calculated Taylor’s factor and the residual stress. The large thermal gradient during the LPBF process induces high dislocation density and strengthens the material, hence, the LPBF HX exhibits better yield strength than conventionally manufactured, wrought HX, but the work hardening capacity and ductility are sacrificed at the same time. Two types of loading condition reveal the anisotropic mechanical behavior, where the vertical and horizontal tests refer to the loading direction being on the BD and TD respectively. The vertical tests exhibit lower strength but better ductility that is related to the larger lattice rotation observed from the samples with different deformation level. Meanwhile, the elongated grain structure and grain boundary embrittlement are responsible for the low horizontal ductility. A ductile to brittle transition is traced at 700 ?, so a further study with two different slow strain rates, 10?5 s?1 and 10?6 s?1, are carried out at 700 ?. Creep damage is shown in the slow strain rates testing. Deformation twinning is found only in the vertical tests where it forms mostly in the twin favorable oriented grain along the LD. The large lattice rotation and the deformation twinning make the vertical ductility remain high level under the slow strain rates. The slow strain rate tensile testing lightens the understanding of creep behavior in LPBF Ni-based superalloys. In summary, this thesis uncovers the tensile behavior of LPBF HX with different variations, including geometry-dependence, temperature-dependence, crystallographic texture-dependence and strain rate-dependence. The generated knowledge will be beneficial to the future study of different mechanical behavior such as fatigue and creep, and it will also enable a more robust design for LPBF applications. Additiv tillverkning, eller 3D-utskrifter, är tillverkningsmetoder där man skapar ett tredimensionellt objekt genom att tillföra material lager for lager. Till skillnad från konventionella avverkande tillverkningsmetoder elimineras många geometriska begränsningar vilket ger större designfrihet och metoderna har därför väckt stort intresse inom en rad olika områden, inklusive flyg-, fordons- och medicinska tillämpningar. I denna avhandling studeras mekaniska egenskaper hos tunnväggiga komponenter tillverkade med en vanligt förekommande laserbaserad pulverbädds-teknik, laser powder bed fusion (LPBF). Det studerade materialet är Hastelloy X, en Ni-baserad superlegering som är vanligt förekommande for både nytillverkning och reparation av komponenter för gasturbiner. Inverkan av mikrostruktur på deformationsmekanismerna vid förhöjda temperaturer undersöks systematiskt. Detta arbete syftar till att ge grundläggande och generisk kunskap som kan tillämpas på olika materialtyper med en kubiskt tätpackad (FCC) kristallstruktur. Det är vanligt att man hittar en utdragen kornstruktur orsakad av den riktade tillförseln av laserenergi i LPBF-processen, vilket kan relateras till olika processparametrar och kan variera mellan utrustningar frän olika leverantörer. Denna avhandling inleds med studien av effekten av scanningsstrategi vid tillverkning av rostfritt stål 316L i en EOS M290-utrustning. En statistisk texturanalys med hjälp av neutrondiffraktion påvisar en tydlig övergång mellan olika mikrostrukturer när olika scanningsstrategier tillämpas. En scanningsrotation på 67 mellan varje lager är en typisk standardinställning med avsikt att sanka anisotropin i materialet, dock finns den utdragna kornstrukturen oftast kvar. I denna avhandling studeras därför de anisotropa egenskaperna hos material tillverkade med 67 scanningsrotation. Effekten av tunnväggiga strukturer i LPBF undersöks genom att studera en uppsättning platta HX-prover, med olika nominella tjocklekar från 4 mm ner till 1 mm, samt en referensgrupp med cylindriska prov med en diameter på 18 mm. Kristallografisk textur som liknar den av

Goss-typ återfinns i de cylindriska proverna vilket gradvis övergår från en fibertextur med i byggriktningen for 4mm-proven till en fibertextur med i tvärriktningen for 1mm-proven. Dragprovning med en töjningshastighet på 10?3 s?1 har utförts på de platta provstavarna från rumstemperatur upp till 700 ?. En sänkning av styrkan uppvisas när proven blir tunnare, vilket kan antas bero på att det lastbarande tvärsnittet överskattas på grund av den grova ytan. En metod för tvärsnittskalibrering föreslås genom att kompensera for ytråheten, och valet av lämplig ytfinhetsparameter motiveras med hänsyn till den beräknade Taylor-faktorn och förekomsten av restspänningar. Den stora termiska gradienten som uppstår for LPBF-processen inducerar en hög dislokationstäthet vilket höjer materialets styrka och följaktligen uppvisar LPBF HX högre sträckgräns an konventionellt tillverkad, smidda HX, men förmågan till deformationshårdnande samt duktiliteten i materialet sänks samtidigt. Tester utförda i två olika belastningsriktningar, vertikalt respektive horisontellt mot byggriktningen, demonstrerar det anisotropiska mekaniska beteendet. De vertikala testerna uppvisar lägre hållfasthet men bättre duktilitet vilket kan relateras till en större benägenhet for kristallstukturen att rotera när deformationsgraden ökar. Samtidigt är den utdragna kronstukturen ansvarig for den lägre duktiliteten for de horisontella proverna. En övergång från ett duktilt till ett mer sprött beteende noterades vid 700 ?, och därför initierades ytterligare en studie där tester med två lägre töjningshastigheter, 10?5 s?1 och 10?6 s?1, utfördes vid 700 ?. Det kan noteras att krypskador återfinns i tester med en långsam deformationshastighet och deformationstvillingar uppstår endast i de vertikala provstavarna där det främst bildas tvillingar i korn orienterade med riktningen längs belastningsriktningen. Den stora förmågan till rotation i kristallstrukturen och deformationstvillingarna bidrar till att den vertikala duktiliteten förblir hög även i testerna med en låg deformationshastighet. Testerna med en långsam draghastighet bidrar därför till en bättre förståelse av krypbeteendet i LPBF Nibaserade superlegeringar. Sammanfattningsvis så bidrar denna avhandling till bättre förståelse av de mekaniska egenskaperna hos LPBF HX i olika utföranden och förhållanden, inklusive geometriberoende, temperaturberoende, deformationshastighetsberoende samt inverkan av kristallografisk textur. Den genererade kunskapen kommer att vara till stor nytta vid fortsatta studier av olika mekaniska egenskaper som utmattning och kryp, samt bidrar till att möjliggöra en mer robust design for LPBF-tillämpningar.

Under the Gen IV advanced reactor development program, the Very High Temperature Reactor (VHTR) is the lead concept. Design and development steps are currently underway to construct a high-temperature reactor as the next generation nuclear plant (NGNP) at Idaho National Laboratory (INL). A major limitation of this system is the development and qualification of high-temperature materials for structural applications. Such materials must possess good high-temperature resistance. Among candidate materials, Alloy 617 and Alloy 230 are considered the most promising structural materials for the VHTR. In order to gain a better understanding of material performance during a high-temperature and long-term service life, various material tests and experiments were conducted to investigate the fundamental deformation mechanisms of the alloys and their long-term degradation process during thermal aging. First, mechanical properties of both alloys were studied by performing tensile tests at three different strain rates and at temperatures up to 1000o.C. This range covers time-dependent (plasticity) to time-independent (creep) deformations. At temperatures from 300 to 700o.C, the yield strength was found to be temperature independent as a result of additional strain hardening provided by dynamic strain aging. However, higher temperatures (>800o.C) activated additional deformation mechanisms, including dislocation creep and dynamic recrystallization, leading to a significant decrease in material strength. Consequently, the fracture mechanisms changed from inclusion particle cracks at temperatures up to 700o.C to triple junction cracks from 800 to 1000o.C. Through a strain-rate sensitivity analysis, the results of tensile tests were extended to approximate the alloys0?9 long-term flow stresses. According to the comparison with these estimated flow stresses, the allowable design stresses for either alloy in American Society of Mechanical Engineers (ASME) B&PV Code did not provide adequate degradation estimation for the long-term service life. However, rupture stresses for Alloy 617, developed in ASME code case N-47-28, can generally satisfy the safety margin estimated in the study following the strain-rate sensitivity analysis. Nevertheless, additional studies on material development are necessary in order for current VHTR conceptual designs to eventually meet design parameters defined by rupture stresses. Additionally, the effect of orientation on Alloy 617 was studied to provide proper guidance for engineering design and alloy development. Mechanical fibering, consisting of an alignment of inclusion particles and matrix crystals, was found to contribute to the mechanical anisotropy of Alloy 617 with varying performances across the studied temperature range. Second, long-term thermal aging experiments (up to 3,000 hours) were performed to investigate the dynamic process of microstructure evolution and, consequently, mechanical property degradation at 900 and 1000°C for both Alloy 617 and Alloy 230. This microstructural evolution was found to be characterized by diffusion-controlled precipitation and coarsening of carbide particles (mainly M23C6 and M6C). The kinetics of particle coarsening was studied though the measurement of volume increase of intergranular particles. The results of the mechanical tests were in good agreement with microstructure observations. Both hardness measurements and tensile tests showed a typical aging process characterized by short-term strengthening and long-term softening. Generally, both alloys aged at 900o.C attained higher yield and tensile strengths with a longer hardening time compared to samples aged at 1000o.C. Alloy 230 exhibited a longer age-hardening duration compared to Alloy 617, due to a lower diffusibility of Tungsten atoms (primary solute element in Alloy 230). Beyond the mechanical tests at room temperature, the long-term aging degradation for high-temperatures tensile properties was found to be comparable to the degradation for low-temperatures properties. Lastly, an advanced measurement technique, high-energy synchrotron radiation, was applied to Alloy 230 to investigate the deformation process during in-situ loading. The small volume fractions of carbides (i.e. ~6% of M6C in Alloy 230), which are difficult to detect using lab-based X-ray machines or neutron scattering facilities, were successfully examined using high-energy X-ray diffraction. The loading processes of the austenitic matrix and the carbide were separately studied by analyzing their different lattice strain evolutions, and thus, the response of each phase to the applied tensile load was clarified. Elastic anisotropy for various polycrystal planes (hkl) was also measured through various reflections for the austenitic matrix. The measured lattice strain can be converted to flow stress by a factor of Young0?9s modulus calculated by Kröner0?9s self-consistent method. The lattice strain measured from the (311) reflection is extensively studied, since it responds almost linearly to the applied stress in both the elastic and plastic regimes. The lattice strain evolution for carbides is different than that for the matrix. During the transition from the elastic regime to the plastic regime, carbide particles experience a dramatic loading process, and the internal stress reaches a critical value. The internal stress for the particles then begins to slowly decrease while the linear stress increases for the matrix. This indicates a continued particle fracture process during plastic deformations of the matrix. Finally, a high-energy diffraction technique was developed that combines synchrotron X-ray radiation and pressurized creep tubes and allows macroscopic creep strain and lattice strain to be simultaneously measured by a single X-ray exposure. A typical creep curve with an evidently identified secondary and tertiary creep was obtained by analyzing the X-ray diffraction patterns. In-situ observations of the development of dislocation densities and lattice strain make it possible to track the onset of accelerated creep void nucleation, growth and coalescence.

A conference on Metallurgical Effects at High Strain Rates was held at Albuquerque, New Mexico, February 5 through 8, 1973, under joint sponsorship of Sandia Laboratories and the Physical Metallurgy Committee of The Metallurgical Society of AIME. This book presents the written proceedings of the meeting. The purpose of the conference was to gather scientists from diverse disciplines and stimulate interdisciplinary discussions on key areas of materials response at high strain rates. In this spirit, it was similar to one of the first highly successful con ferences on this subject held in 1960, in Estes Park, Colorado, on The Response of Metals to High Velocity Deformation. The 1973 conference was able to demonstrate rather directly the increased understanding of high strain rate effects in metals that has evolved over a period of roughly 12 years. In keeping with the interdisciplinary nature of the meeting, the first day was devoted to a tutorial session of invited papers to provide attendees of diverse backgrounds with a common basis of understanding. Sessions were then held with themes centered around key areas of the high strain rate behavior of metals.

In this study, the change of microstructure and the formation of cracks in a solid propellant under an incremental strain loading condition were investigated using digital radiography x-ray techniques. Experimental findings revealed that the degree of in homogeneity of the material's microstructure and the number of non-propagating cracks increased as the applied strain was increased. Also, the strain distribution was highly non-uniform when the applied strain was high.

Adiabatic shear localization is a mode of failure that occurs in dynamic loading. It is characterized by thermal softening occurring over a very narrow region of a material and is usually a precursor to ductile fracture and catastrophic failure. This reference source is the revised and updated version of the first detailed study of the mechanics and modes of adiabatic shear localization in solids. Building on the success of the first edition, the book provides a systematic description of a number of aspects of adiabatic shear banding. The concepts and techniques described in this work can usefully be applied to solve a multitude of problems encountered by those investigating fracture and damage in materials, impact dynamics, metal working and other areas. Specific chapters focus on energetic materials, polymers, bulk metal glasses, and the mathematics of shear banding as well as the numerical modeling of them. With its detailed coverage of the subject, this book is of great interest to academics and researchers into materials performance as well as professionals. Up-to-date coverage of the subject and research that has occurred over the past 20 years Each chapter is written on a different sub-field of adiabatic shear by an acknowledged expert in the field Detailed and clear discussions of each aspect

This book contains the proceedings of EXPLOMETTM 2000, International Conference on Fundamental Issues and Applications of Shock-Wave and High-Strain-Rate Phenomena, held in Albuquerque, New Mexico, 2000; the fifth in the EXPLOMETTM quinquennial series which began in Albuquerque in 1980. The book is divided into five major sections with a total of 85 chapters. Section I deals with materials issues in shock and high strain rates while Section II covers shock consolidation, reactions, and synthesis. Materials aspects of ballistic and hypervelocity impact are covered in Section III followed by modeling and simulation in Section IV and a range of novel applications of shock and high-strain-rate phenomena in Section V. Like previous conference volumes published in 1980, 1985, and 1995, the current volume includes contributions from fourteen countries outside the United States. As a consequence, it is hoped that this book will serve as a global summary of current issues involving shock and high-strain-rate phenomena as well as a general reference and teaching componant for specializd curricula dealing with these features in a contemporary way. Over the past twenty years, the EXPLOMETTM Conferences have created a family of participants who not only converse every five years but who have developed long-standing interactions and professional relationships which continue to stimulate new concepts and applications particularly rooted in basic materials behavior.

The papers collected together in this volume constitute a review of recent research on the response of condensed matter to dynamic high pressures and temperatures. Inlcuded are sections on equations of state, phase transitions, material properties, explosive behavior, measurement techniques, and optical and laser studies. Recent developments in this area such as studies of impact and penetration phenomenology, the development of materials, especially ceramics and molecular dynamics and Monte Carlo simulations are also covered. These latest advances, in addition to the many other results and topics covered by the authors, serve to make this volume the most authoritative source for the shock wave physics community.

Monitoring and control of microstructure evolution in metal processing is essential in developing the right properties in a metal. Microstructure evolution in metal forming processes summarises the wealth of recent research on the mechanisms, modelling and control of microstructure evolution during metal forming processes. Part one reviews the general principles involved in understanding and controlling microstructure evolution in metal forming. Techniques for modelling microstructure and optimising processes are explored, along with recrystallisation, grain growth, and severe plastic deformation. Microstructure evolution in the processing of steel is the focus of part two, which reviews the modelling of phase transformations in steel, unified constitutive equations and work hardening in microalloyed steels. Part three examines microstructure evolution in the processing of other metals, including ageing behaviour in the processing of aluminium and microstructure control in processing nickel, titanium and other special alloys. With its distinguished editors and international team of expert contributors, Microstructure evolution in metal forming processes is an invaluable reference tool for metal processors and those using steels and other metals, as well as an essential guide for academics and students involved in fundamental metal research. Summarises the wealth of recent research on the mechanisms, modelling and control of microstructure evolution during metal forming processes Comprehensively discusses microstructure evolution in the processing of steel and reviews the modelling of phase transformations in steel, unified constitutive equations and work hardening in microalloyed steels Examines microstructure evolution in the processing of other materials, including ageing behaviour in the processing of aluminium

There has been considerable interest over the last decade in processing materials using various techniques of severe plastic deformation (SPD) in which intense plastic straining is achieved under a high confining pressure 1,2. These techniques have the potential of refining the microstructure of metals and alloys to the submicrometer or even the nanometer range. The two most important SPD techniques for producing bulk non-porous samples are equal-channel angular pressing (ECAP) and high-pressure torsion (HPT).

Recently, a series of papers described the microstructural evolution occurring during ECAP and it was shown that the mean grain size and microstructure homogeneity were dependent upon the precise pressing procedure 3-5. By contrast, no such detailed investigations have been conducted to date to evaluate the parameters influencing HPT (e.g., applied pressure, total strain, temperature). In earlier reports, it was found for several metals and alloys that a pressure of 5 UPa and more than five rotations of the sample in torsion were generally sufficient to produce a reasonably homogenous microstructure with a mean grain size close to 100 inn throughout the sample 2,6. This paper reports preliminary results on the microhardness and microstructural evolution during HPT in samples of pure nickel. A detailed transmission electron microscopy (TEM) and X-ray study is currently in progress.