

Table of contents

Preface

High-entropy alloys

Brazing of high temperature materials using melting range optimized filler metals based on the high-entropy alloy CoCrCuFeNi	1
W. Tillmann, L. Wojarski, T. Ulitzka, H. Ulitzka, and M. Manka, Dortmund/DE	

Development of novel nickel-based brazing alloys, utilising alternative melting point depressants and high entropy alloy concepts	7
L. Hardwick, Sheffield/UK, P. Rodgers, Loughborough/UK, E.J. Pickering, Manchester/UK, and R. Goodall, Sheffield/UK	

Brazing for tool applications

The effect of nickel-plated surfaces on the microstructure and strength of vacuum brazed nickel maraging steel	18
W. Tillmann, L. Wojarski, T. Henning, and M. Möbus, Dortmund/DE	

Brazing of cemented carbide with steel using Cu-Mn-Ni filler metals	26
V. E. Misnikov, I. N. Pashkov, T. A. Bazlova, V. E. Bazhenov, Moscow/RU	

Fundamental study on the tempered state of steel blades influenced by the brazing process parameters for joining of hard metals to saw blades	32
M. Schimpfermann, and G. Wiehl, Hanau/DE; M. Magin, and S. Rassbach, Mamer/LU; N. Unnasch, and A. Kazuch, Iserlohn/DE	

Improved process control during induction brazing	40
K. Bobzin, M. Öte, S. Wiesner, and J. Hebing, Aachen/DE	

Effect of minimizing the thickness of the copper intermediate layer in carbide tipped tools on the shear strength of the brazed joint	46
M. Schimpfermann, Hanau/DE; M. Magin, and S. Rassbach, Mamer/LU	

Brazing for turbine applications

Investigations on vacuum furnace brazed dissimilar material compounds of 16Mo3 and INCONEL 625 using nickel-based filler materials	53
R. Blank, and I. Reinkensmeier, Berlin/DE; G. Wagner, and T. Uhlig, Chemnitz/DE	

Brazing Process, Enabler for Lifetime Extension of Gas Turbines	62
S. M. Puidokas, and K. Weidemann, CH; B. Berme, Istanbul/TR	

Application of a Ni-based filler metal repair coating by thermal spraying for high pressure turbines – A hybrid coating, brazing and aluminizing process	71
M. Nicolaus, K. Möhwald, and H. J. Maier, Garbsen/DE	

Influence of superalloy additives on the melting behaviour of green tapes for gas turbine repair brazing	77
K. Bobzin, M. Öte, S. Wiesner, Aachen/DE; H. Krappitz, S.M. Uddin, Esslingen/DE	

Properties of brazed joints 1

Investigation of interfacial reaction during stainless brazing by Ni-base filler with EBSD	84
T. Sasaki, M. Ono, M. Iwata, Y. Bizen, and Y. Miyazawa, Kanagawa/JP	
Investigation on corrosion behavior of 316L stainless steel joints brazed with a new amorphous nickel-chromium based filler metal	89
Y. Li, and H. Li, Beijing/CN; J. Senkara, Warsaw/PL; H. Zhuang, Z. Li, Beijing/CN	
Corrosion fatigue performance of brazed 304L stainless steel joints using gold-based brazing alloys	96
A. Schmiedt-Kalenborn, F. Walther, M. Manka, and W. Tillmann, Dortmund/DE	
Improvement of fatigue strength and structural design in heavy steel constructions through arc brazing	103
A. Gericke, and F. Wegener, Rostock/DE; U. Kuhlmann, and K. Drebendstedt, Stuttgart/DE; R. Glienke, Wismar/DE; K.-M. Henkel, Rostock/DE	

Brazing of light metals and intermetallics

Surface Pretreatment of Steel Sheets for a Compound Casting Process of low-distortion and low-gap Aluminium Cast-Steel Sheet Hybrids	112
K. Bobzin, M. Öte, S. Wiesner, and L. Gerdt, Aachen/DE	
Increasing of brazed joint strength of thin sheet metals for arc brazing with different low-melting filler wires	117
U. Reisgen, M. Angerhausen, A. Pipinikas, T. Twiehaus, Aachen/DE	
Joining of TiAl-based alloy by using Ti-Ni-Nb-Zr filler alloy	125
Y. L. Shang, H. S. Ren, Y. J. Jing, H.P. Xiong, X.Y. Ren, and Y. Y. Cheng, Beijing/CN	
Effect of deep cooling on properties and microstructure of titanium brazed joints	131
A. E. Shapiro, Columbus/US	

Properties of brazed joints 2

Influence of the process atmosphere on the fatigue behavior of brazed stainless steel joints before and after corrosive attack.....	137
V. Fedorov, T. Uhlig, and G. Wagner, Chemnitz/DE; A. Langohr, and U. Holländer, Hannover/DE	
Thermal fatigue of steel joints brazed with various NiCrSiB filler metals	142
M. Penyaz, A. Ivannikov, O. Sevryukov, and P. Dzhumaev, Moscow/RU	
Investigation of residual stresses in high-temperature-brazed hybrid Cr-CrNi-steel joints	149
U. Holländer, S. Kresnik, M.A. Swider, and K. Möhwald, Garbsen/DE; W. Zinn, A. Magnier, B. Scholtes, and T. Niendorf, Kassel/DE	

Exploring the stress state of brazed single lap-joints using FEA simulations 156
D. J. Kemmenoe, and S. P. Baker, Ithaca/US; E. A. Theisen, and W. Coughlan, Conway/US

In-situ observation of crack propagation in brazed joints 162
T. Uhlig, and G. Wagner, Chemnitz/DE; S. Weis, Zwickau/DE

Diffusion brazing and bonding

Understanding solidification kinetics during TLP bonding of an austenitic stainless steel using BNi-5 brazing alloy 167
S. Guernaoui, B. Rouat, J. Zollinger, and H. Combeau, Nancy/FR

Control of Deformation and Material Issues during Diffusion Bonding of Micro Process Devices 174
Th. Gietzelt, V. Toth, T. Wunsch, R. Dittmeyer, Karlsruhe/DE

Development of diffusion bonded large scale parts for highly stressed tool applications 177
J. Pfeiffer, Wettenberg/DE; F. Gemse, and S. Jahn, Jena/DE; V. Frettlöh, and U. Hinzpeter, Lüdenscheid/DE; D. Günther, and U. Staps, Triptis/DE

Reaction-assisted bonding of Ti6Al4V alloy with Ti/Ni reactive nanostructured multilayers and interdiffusion behavior simulation employing molecular dynamics modelling 188
H. Li, B. Xu, L. Yang, and J. Yuan, Beijing/CN; Y. Ma, and A. Hu, Beijing/CN // Knoxville/US

Brazing of ceramic and glass

Crystallization processes of BaO-CaO-SiO₂-glasses as sealing material for the application in SOCs 193
S.-M. Gross-Barsnick, J. Brendt, C. Babelot, and G. Natour, Jülich/DE

Brazes for extremely high temperatures 199
H.-P. Martin, S. Roszeitis, and B. Matthey Hermsdorf/DE; M. Herrmann, and M. Graffe, Dresden/DE; M. P. Schmidt, and U. Burkhardt, Dresden/DE

Brazed metal-ceramic components for space applications 207
H.R. Elsener, B. Rheingans, and L.P.H. Jeurgens, T. Burgdorf, Dübendorf/CH; S. Brüngger, D. Piazza and P. Wurz, Bern/CH

Application methods for brazing metals

Development and application of thermoplastic-coated particles for joining with powder brazing alloys 215
M. Schmieding, U. Holländer, F. Weber, E. Schmidt, K. Möhwald, and H. J. Maier, Hannover/DE

Hybrid friction surfacing – Supporting a friction surfacing process by resistance heating 222
D. Köberlin, S. Heilmann, J. Zschetsche, U. Füssel, Dresden/DE

In-situ chromium carbide formation in carbon-modified brazed NiCrP-coatings 228
U. Holländer, and K. Möhwald, Garbsen/DE

Development of brazing metals

Estimation of Pb-free brass soldering-ability using in situ observation method	235
H. Tajima, H. Okada, Y. Miyazawa, Knagawa/JP, and H. Tameda, Nagano/JP	
Influence of tin on the wetting behavior of aluminum	240
K. Bobzin, M. Öte, S. Wiesner, and A. Schmidt, Aachen/DE; A. Aretz, and J. Mayer, Aachen/DE	
Surface deoxidation mechanisms of stainless steels in vacuum brazing processes	247
C. Strauß, L. Wegewitz, R. Gustus, W. Maus-Friedrichs, Clausthal-Zellerfeld/DE; S. Schöler, U. Holländer, K. Möhwald, Garbsen/DE	
Development of low silver content brazing filler metal	252
K. Matsu, Tokyo/JP; K. Shi, Saitama/JP; T. Kishimoto, T. Terui, and T. Takahashi, Gunma/JP	

Brazing of Ni-/Fe-bases materials

Manufacturing of Nickel-based brazing form parts by means of additive manufacturing	256
M. T. Schmitt, Eisenberg/DE	
Furnace brazing of Inconel 718 using Ni nanoparticles as brazing filler metals	259
D. Bridges, and A. Hu, Knoxville/US; R. Xu, Indianapolis/US	
Development of High Corrosion Resistant Ni Based Brazing Filler Material Including Fe and Cu	267
T. Sawada, Hyogo/JP	
Effect of Brazing Atmosphere on the Corrosion Resistance of Ferritic Stainless Steels Braze with Ni- and Fe-base Filler Metals	273
T. Grøstad, and L. Kjellén, Höganäs/SE; M. Stroiczek, Düsseldorf/DE	
Microstructure and Joint Strength Properties when Brazing with Nickel and Nickel-Iron Based Amorphous Brazing Foils	281
E. Theisen, and W. Coughlan, Conway/US; D. Kemmenoe, and S. Baker, Ithaca/US	

Poster Session

Development and application of thermoplastic-coated particles for joining with powder brazing alloys (<i>For Poster Session 02 see conference presentation pp. 215</i>)	285
M. Schmieding, U. Holländer, F. Weber, E. Schmidt, K. Möhwald, and H. J. Maier, Hannover/DE	
Development of copper aluminium composite wires for the in-situ formation of CuAl based braze metals for furnace brazing of CrNi steels	286
M. Schmieding, U. Holländer, F. Weber, K. Möhwald, and H. J. Maier, Hannover/DE	
Influence of the process atmosphere on the fatigue behavior of brazed stainless steel joints before and after corrosive attack	291
(<i>For Poster session 05 see conference presentation pp. 137</i>)	
V. Fedorov, T. Uhlig, and G. Wagner, Chemnitz/DE; A. Langohr, and U. Holländer, Hannover/DE	
Hybrid friction surfacing – Supporting a friction surfacing process by resistance heating	292
D. Köberlin, S. Heilmann, J. Zschetzsche, and U. Füssel, Dresden/DE	

High Entropy Alloys as Brazing Filler Metals	297
R. Goodall, Sheffield/UK	
Kinetic investigations for brazing Zn-surfaced AISi Duplex braze metal coatings with NH ₄ Cl-doped process gases	306
A. Langohr, U. Holländer, and K. Möhwald, Garbsen/DE; S. Groß-Böltting, Dortmund/DE	
Joining sintered NdFeB permanent magnets using two kinds of filler metals: microstructure and mechanical properties	315
C. Luo, X. Qiu, Y. Ruan, Y. Lu, and F. Xing, Changchun/CN	
The thermal stability of Cu/W nano-multilayers for low-temperature brazing applications	319
Z. Xing, H. Li, and Q. Qiao, Beijing/CN; B. Lehmet, M. Manka, and W. Tillmann, Dortmund/DE	
Influence of Gap Clearance on Brazing Joint Strength for Ni- and Fe-base Filler Metals for Brazing Ferritic Stainless Steels	324
T. Grøstad, and L. Kjellén, Höganäs/SE; M. Stroiczek, Düsseldorf/DE	
Ultra-rapid formation of Cu ₃ Sn joints through ultrasonic-assisted die bonding with Sn+Cu composite solder paste for high temperature application	336
H. Ji, H. Pan, and M. Li, Shenzhen/CN	
Direct bonding of Al ₂ O ₃ ceramic, Cu and 5056 aluminum alloy with Sn-Zn-Sb type solders	344
J. Zhang, W. Qua, and H. Zhuang, Beijing/CN; H. Li, Beijing/CN	
Joint interface of diamond produced by using nano-gold ink and vanadium examined by infrared-rays spectroscopic analysis	349
M. Hino, and T. Yamazaki, Tokyo/JP	
Scarf joining repair of Carbon/Carbon composite using Au-Ni-Cr alloy powder	356
T. Yamazaki, M. Fukuda, and G. Yamazaki, Tokyo/JP	
Coating technologies for tailored brazing solutions	362
T. Burgdorf, H.R. Elsener, B. Rheingans, C. Cancellieri, L.P.H. Jeurgens, and J. Janczak-Rusch, Dübendorf/CH	
Study on Brazing SiC Ceramics and Metal Mo with AuPdCoMnNi Alloy	365
H. Feng, B. Chen, H. Xiong, W. Li and Y. Cheng, Beijing/CN	
Analysis of interfacial microstructure of stainless steel brazed joint using EBSD method	371
T. Sasaki, M. Ono, M. Iwata, Y. Bizen, and Y. Miyazawa, Kanagawa/JP	
Estimation of the corrosion resistance of ferritic stainless steel brazed joint using an electrochemical method	376
T. Sasaki, K. Kudo, M. Ono, M. Iwata, Y. Bizen, and Y. Miyazawa, Kanagawa/JP	
Metallurgical analysis at the brazed joint of metallic cultural heritages	382
H. Sato, Y. Miyazawa, and K. Yamahana, Kanagawa/JP	
Influence of vibratory action on soldered joint formation	386
I. N. Pashkov, V. E. Misnikov, T. A. Bazlova, and V. E. Bazhenov, Moscow/RU	
In situ observation during copper alloy brazing using X-ray system	392
H. Okada, H. Okamura, and Y. Miyazawa, Kanagawa/JP; F. Kanazaki, Saitama/JP	

The effect of Molybdenum and Vanadium on Corrosion Behaviour of High Chromium Nickel Brazing Alloys	397
S. Sivasli, I.S. Sorucu, and K. Boz, Izmir/TR	
Development of rapidly quenched filler alloys for brazing of ITER and DEMO components ..	403
A.N. Suchkov, D. M. Bachurina, B. A. Kalin, O. N. Sevriukov, and A. A. Ivannikov, Moscow/RU	
Damage Zone Analysis of Ni-Based Super Alloy Braze Joints for Gas Turbine Applications	408
J. Wildofsky, B. Alexandrov, and A. Benatar, Columbus/USA; R. Xu, Indianapolis/USA	
Melting characteristics of selected brazing filler metals by thermal analysis; Differential Scanning Calorimetry (DSC)	409
L. Johnson, and M. Weinstein, Los Lunas/US; L. Lee, Madison Heights/US; A. J. Battenbough, and A. M Osmand, Pontardawe/UK	
Brazing of stainless steel and C/C composite	415
M. Uchibori, T. Sasaki, and Y. Miyazawa, Hiratsuka/JP	
List of authors	419