



Proceedings of the 8th Asian-Australasian Conference on Composite Materials

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Composites: Enabling Tomorrow's Industry Today

Editors

M. Jaafar, A. R. Azura, K. H. Leong and A. Y. L. Leong

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Editorial

This proceedings contains the papers submitted to and presented at the Eighth Asian-Australasian Conference on Composite Materials (ACCM-8) held on 6-8 November 2012 in Kuala Lumpur, Malaysia. The subject areas covered by the 270 odd papers are diverse that hence indicates the vibrancy and hive of research and development activities happening in the advanced materials and composites circle. The wide-ranging topics covered include natural fibre composites, nanocomposites, fire performance, thermoplastic composites, textile composites, green cement and composites, self-healing materials, inspection and health monitoring, rubber-based composites, and biocomposites, as well as more traditional topics such as interfaces, and fracture, amongst others.

All submissions have been subjected to a review process in order to ensure a high quality in papers considered for the conference. Submitted papers were reviewed from the point of significance of results, new contribution of composite field and relevance to the conference scope. Authors of selected papers will be invited to have their work published in special issues of 5 refereed International journals, namely Composite Interfaces, Plastics, Rubber and Composites, Journal of Reinforced Plastics and Composites, Journal of Sustainable Cement-based Materials and Journal of Intelligent Material Systems. Further selected papers will also be considered for publication in 3 refereed Malaysian journals, namely Journal of Physical Science, Journal of Engineering Science, and International Journal for the Advancement of Science and Arts.

Each paper in the proceedings has a unique identity denoted by an alphanumeric code. The first alphabet denotes the mode of presentation where the letters "O" and "P" are to signify oral and poster, respectively. The papers are also classified according to the specific topic covered and this is represented by three alphabets; the set of topics summarised separately in this proceedings. Finally a 3-digit number is assigned. To illustrate this, for example, a paper on nanocomposites that is presented orally at the conference would have representative code like "O-NAN-999".

We trust that this collection of papers will serve as useful reference to the advanced research and engineering community. We would like to take this opportunity to thank everyone who has contributed papers to ACCM-8.

M. Jaafar and A.R. Azura, *Universiti Sains Malaysia*

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Nomenclature

APP	Application
BIO	Biomedical Composites
DES	Design and Optimisation
DUR	Durability
FIR	Fire Performance
FRA	Fracture, Creep & Fatigue
FWE	Friction and Wear
GCC	Green Cement and Concrete
GRE	Green Composites
ITP	Interfaces and Interphases
JOI	Joints
MCM	Metal/Ceramic Matrix Composites
MEC	Mechanics of Composites
MFC	Multifunctional Composites
NAN	Nanocomposites
NAT	Natural Fibre Composites
NUM	Numerical Methods/Multi-Scale Modelling
ONR	ONR Research
PRO	Process and Manufacturing
REP	Repair
RUB	Rubber-Based Composites
SEL	Self-Healing Composites
SHM	Inspection and Health Monitoring
SMA	Smart Materials and Composites
TEM	Testing & Experimental methods
THE	Thermoplastic Composites
TUB	Tubular Structures
TXT	Textile Composites

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Z.A. Mohd Ishak	O-FIR-139	H. Nakatani	O-MEC-030
Z.A. Mohd Ishak	O-GRE-068	H. Nakatani	O-NAT-330
Z.A. Mohd Ishak	P-NAT-144	I.W. Nam	P-GRE-248
Z.A. Mohd Ishak	O-RUB-034	J.-D. Nam	P-GRE-360
M. Mohiuddin	O-MFC-304	A. Nanayakkara,	O-JOI-332
C. Montes	O-GCC-331	Y. Narita	O-DES-092
C. Moreno-Belle	O-SEL-020	Y. Narita	O-DES-094
Y. Mori	O-PRO-157	Y. Narita	O-DES-142
R. Morinaga	O-TXT-326	Y. Narita	O-TEM-185
T. Morisugi	P-SMA-367	M.R.E. Nasution	O-NUM-188
M. Morkotjinda	P-MCM-209	T. Natsuki	O-SHM-187
T. Moromizato	O-ONR-088	M. Nazariah	O-GRE-259
E.V. Morozov	O-TUB-220	S. Nazira	O-PRO-021
T. Motochika	O-PRO-320	Y. Nekoshima	P-JOI-031
A. Mouritz	O-JOI-332	C.H. Neo	P-GRE-360
A.P. Mouritz	O-SEL-060	A.T.T. Nguyen	O-FRA-273
A.P. Mouritz	O-SEL-339	K.H. Nguyen	O-SEL-339
A.P. Mouritz	O-SEL-371	Q.-Q. Ni	O-SHM-187
L. Mu	P-FWE-099	V. Nigam	O-MFC-136
L.W. Mu	O-FWE-227	C.C. Ning	O-FWE-138
Y. Mubarak Sani	O-GCC-148	F. Ninomiya	O-GRE-083
N.I. Muhd Nazdri	O-GCC-063	R. Nishida	O-NAT-225
M.A Murad	O-REP-351	R. Nishida,	O-FRA-222
T. Murakoshi	P-MCM-240	M. Nishikawa	O-TEM-375
K. Murata	O-MFC-105	K. Nishiyabu	P-SMA-367
K. Murata	P-MFC-129	K. Nishiyabu	O-THE-264
M.F. Mustafa	P-MFC-183	Y. Nitandai	O-TUB-317
S. Mustapha	O-NAN-200	J. Noda	O-MCM-055
S.N.H. Mustapha	O-SHM-040	J. Noda	O-NAN-239
W.-J. Na	O-TXT-312	J. Noda	P-NAT-112

S. Noor Rosyidah	O-GCC-148	W.L. Park	O-JOI-294
F.M. Nor	O-BIO-311	W.S. Park	O-JOI-368
A. Nordin	O-NAN-239	Y. Park	O-MFC-102
N.Z. Noriman	O-GRE-039	Y.B. Park	O-MFC-228
C. Norris	O-SEL-309	Y.B. Park	O-NAN-026
A.R. Nur Humairah	O-GRE-259	Y.B. Park	P-PRO-241
M.R. Nur Suraya	O-GRE-259	P. Pasbakhsh	O-BIO-075
M.R. Nurul Fazita	O-NAT-038	P. Pasbakhsh	O-BIO-191
A.M. NurulHuda	O-NAT-319	C. Pen	O-RUB-143
K. Obunai	O-REP-131	C. Pillsbury	P-SEL-369
K. Ogi	O-PRO-089	K. Pingkarawat	O-SEL-371
S. Ogihara	P-JOI-031	P. Písařík	O-BIO-051
S. Ogihara	O-MEC-030	J. Prapai	P-MCM-209
S. Ogihara	O-NAT-330	C.V. Prasad	O-NAT-308
N. Ohtake	P-NAN-313	J.L. Provis	O-GCC-013
A. Ohtani	O-TXT-326	F.-L. Pua,	O-GRE-100
A. Ohtani	O-TXT-329	S. Raadnui	O-MCM-076
A. Oishi	O-GRE-083	S. Ragunathan	O-RUB-301
Y. Oishi	O-TXT-235	R. Rahbari Ghahnavieh	O-MCM-359
M. Okubo	P-SHM-147	S. Rahim	O-GRE-068
Z.X. Ooi	O-NAN-113	W. Rahman	O-MCM-224
A.C. Orifici	O-SEL-339	A.R. Rahmat	O-NAN-200
M.R. Osman	O-DUR-085	K.P. Rao	O-MEC-336
K. Ota	P-NAN-313	C.T. Ratnam	O-PRO-021
A.R. Othman	O-FIR-139	C.T. Ratnam	O-RUB-150
N. Othman	O-JOI-043	N.W.A. Razak	O-JOI-043
P. Ouagne	O-FIR-170	S.N.A. Razak	O-NAT-069
K. Ozaki	O-REP-131	N. Redzuan	O-BIO-314
C.P. Pagwiwoko	P-TUB-033	A. Reid	O-GCC-117
B.B. Pajarito	O-DUR-271	J. Remsa	O-BIO-051
T. Palathai	O-MCM-076	N. Reuther	O-FIR-058
L. Pan	O-ITP-074	M. Ridha	O-ONR-341
J.K. Pandey	O-NAT-035	N.I.M. Ridwan	P-MFC-183
J.K. Pandey	O-NAT-104	I. Riku	O-MFC-105
S.D. Pandita	O-GRE-128	I. Riku	P-MFC-129
W.K. Pang	O-MCM-111	S. Rivallant	O-NUM-095
I.-K. Park	P-DUR-253	S.S. Rizam	P-MCM-086
J. Park	O-FRA-242	J.U. Roh	O-THE-036
J.K. Park	O-FRA-295	Y.S. Rohana	O-RUB-065
J.K. Park	P-FRA-335	M.Z. Rong	O-FWE-052
J.M. Park	P-GRE-234	M.Z. Rong	O-NAN-161
J.M. Park	P-GRE-360	M.Z. Rong	O-SEL-070
J.S. Park	O-ITP-101	C.A.P. Rookus	O-TUB-171
J.-S. Park	O-ITP-101	S. Roseno	O-THE-125
J.-S. Park	O-JOI-267	S. Rossignol	O-GCC-363

R. Roy	O-NUM-261	Y.J. Shi	P-FWE-099
W.H. Ruan	O-NAN-161	Y.J. Shi	O-FWE-227
A.K. Rudin	O-RUB-150	K. Shibata	O-PRO-146
S.-R. Ryu	P-RUB-244	Y.-F. Shih	P-GRE-044
F.A. Sabaruddin	O-ITP-345	D.K. Shin	O-DES-084
T. Sakai	O-TUB-317	D.S. Shin	O-MFC-228
K. Sakata	O-ITP-155	K. Shiono	O-MFC-233
K. Sakata	O-PRO-157	O. Sidek	O-GRE-079
S. Sakurada	P-NAT-112	I. Singh	O-NAT-365
A. Sakuratani	O-FRA-167	M. Siti Alwani	O-NAT-324
H. Salmah	O-GRE-061	Z. Siti Fatimah	P-FRA-346
H. Salmah	O-THE-156	A.S. Siti Nuraya	O-RUB-072
S.T. Sam	O-GRE-039	P.A. Smith	O-NUM-066
N. Samat	O-ITP-345	N. Sombatsompop	O-MCM-076
P. Samayamutthiririan	O-THE-014	N. Sombatsompop	O-NAT-046
S.A. Samsudin	O-THE-163	G. Son	O-FRA-295
S.A. Samsudin	O-THE-297	H.G. Son	O-NAN-026
F. Samyn	O-FIR-130	J.I. Song	O-MCM-307
F. Samyn	O-FIR-170	J.I. Song	P-MFC-328
H. Sano	O-THE-213	J.I. Song	O-NAT-308
S.M. Sapuan	O-DUR-361	K.H. Song	P-NUM-246
S.M. Sapuan	O-GRE-100	S. Sprenger	O-FRA-162
K.A.M. Sari	O-GCC-231	H.-S. Su	P-FIR-186
N. Sarifuddin	O-THE-193	H.-S. Su	O-FRA-180
Y. Sasaki	P-SHM-147	X. Su	O-MCM-158
N. Sato	O-FRA-027	A.S. Subramanian	O-GRE-128
S. Satoh	O-SHM-145	C.H.V. Sudhakar	O-MFC-136
A.K. Saxena	O-MFC-136	P. Sudhakara	O-NAT-308
G. Scheltjens	O-SEL-006	H. Suemasu	O-ITP-154
G. Scheltjens	O-SEL-230	H. Suemasu	O-NUM-064
A.K. Schlarb	O-NAN-005	A.B. Sulong	O-PRO-321
H.-W. Seo	P-GRE-360	W.S. Sum	O-REP-121
S.B.S. Shahnaz	O-GRE-039	K.Y. Sun	P-FWE-099
J.B. Shamsul	P-FRA-073	S.Y. Sun	O-FWE-138
J.B. Shamsul	O-GCC-063	Y.N. Sun	O-ITP-024
J.B. Shamsul	O-MCM-045	Z. Sun	O-ITP-024
J.B. Shamsul	P-MCM-086	M.-H. Sung	O-FRA-180
J.B. Shamsul	O-MCM-224	M.-H. Sung	O-MCM-158
K. Shankar	O-TUB-220	E.E. Supeni	O-SMA-199
R.M. Sheltami	O-NAN-028	A. Syayuthi A.R.	P-JOI-166
R.M. Sheltami	O-NAN-265	A. Syayuthi A.R.	O-TUB-171
M.-Y. Shen	O-FRA-180	A. Syayuthi A.R.	P-FRA-340
M.-Y. Shen	O-MCM-158	A.Z. Syazana	O-SMA-372
L.W. Sheng	O-JOI-043	Y. Tabuchi	P-SMA-367
R.V. Sheril	O-THE-014	K. Taguchi	O-GRE-083

P.M. Tahir	O-NAT-275	B. Van Mele	O-SEL-006
H. Takagi	O-NAT-035	B. Van Mele	O-SEL-230
H. Takagi	O-NAT-104	H. van Zeijl	O-SEL-020
K. Takahashi	O-DES-092	R. Varley	O-SEL-060
Y. Takahashi	O-THE-213	R. Varley	P-SEL-369
T. Takayama	O-THE-213	R.J. Varley	O-SEL-371
Y. Takechi	P-SHM-147	B. Vetayanugul	O-MCM-210
N. Takeda	O-NUM-268	A. Virk	O-REP-354
N. Takeda	O-SHM-059	A. Wada	O-SHM-145
D. Talamona	O-GCC-380	A. Wada	P-SHM-147
M.N. Tamin	O-FRA-299	A.A. Wahab	O-PRO-263
K.H. Tan	O-GCC-380	M.U. Wahit	O-GRE-160
D. Tanabe	P-SMA-367	M.U. Wahit	O-ITP-054
D. Tanabe	O-THE-264	M.U. Wahit	O-NAT-159
L.-C. Tang,	O-FRA-162	W.A. Wan Abdul Rahman	O-NAT-135
J. Tao	P-FIR-186	W.O. Wan Nadirah	O-NAT-319
J. Tao	O-ITP-074	W.M.Z. Wan Yunus	O-GRE-067
J. Tao	P-NAN-189	C. Wang	O-BIO-075
J. Tao	O-TXT-140	C.H. Wang	O-FIR-120
M.A. Tarawneh	O-RUB-077	C.H. Wang	O-GCC-013
T.E. Tay	O-ONR-341	C.-J. Wang	O-GCC-117
K. Tei	O-THE-213	D. Wang	O-GCC-364
Y. Tezuka	O-RUB-143	H. Wang	O-ITP-101
C. Thongpin	O-NAN-223	H. Wang	O-ITP-284
W. Tian	O-SEL-327	H. Wang	O-MCM-307
H.-W. Tien	O-NAN-322	H. Wang	O-MEC-116
K. Tokuno	O-NAN-239	H. Wang	O-MFC-102
K. Tomihashi	O-TEM-185	H. Wang	O-NAT-168
R. Tongsri	O-MCM-076	H.J. Wang	O-NAT-323
R. Tongsri	P-MCM-209	J.J. Wang	P-NUM-246
R. Tongsri	O-MCM-210	K. Wang	O-SEL-060
N. Tosangthum	P-MCM-209	Y. Wang	O-SEL-339
H. Toyoda	O-GRE-310	Y.Q. Wang	O-SEL-371
H. Toyoda	O-PRO-146	Y.R. Wang	O-SHM-040
M. Trada	O-NAT-025	Z.J. Wang	O-SHM-277
H.N. Tran	O-NAT-330	Z.J. Wang	O-TEM-236
R. Trask	O-SEL-309	N. Watanabe	O-FRA-190
J.L. Tsai	O-NAN-007	N. Watanabe	O-NUM-064
K.Y. Tshai	O-TUB-032	N. Watanabe	O-NUM-188
K.Y. Tshai	P-TUB-033	N. Watanabe	O-TXT-165
S. Tsutaya	O-THE-264	Y. Watanabe	O-TXT-235
Ş. Uğur	O-RUB-349	J. Wei	P-FRA-340
G. Van Assche	O-SEL-006	J.-S. Wei	O-GRE-128
G. Van Assche	O-SEL-230	N.B. Wei	O-ITP-074
S. van der Zwaag	O-SEL-020	J. Weitzenböck	O-REP-378

N. Wiegand	O-ITP-023	G.A. Yu	O-FIR-120
P. Wila	O-MCM-210	L.M. Melody Yu	O-FRA-192
Z. Wong	O-ITP-024	T. Yu	O-GRE-061
K.-D. Woo	P-MCM-237	T. Yu	O-ITP-284
C. Wood	O-SEL-327	W.-R. Yu	O-MEC-280
C.-M. Wu	O-DUR-022	Y.H. Yu	O-TXT-312
C.-M. Wu	O-FWE-138	X.W. Yuan	O-GRE-216
J. Wu	O-FWE-227	X.W. Yuan	O-THE-196
Y.C. Wu	O-ITP-284	A. Yudhanto	O-FRA-190
H. Xia	O-SHM-187	J.H. Yun	O-JOI-274
J. Xu	O-FWE-138	Z. Yusoff	O-MCM-045
J. Xue	P-NAN-189	A.A. Yussuf	O-ITP-054
H. Yagi	O-GRE-083	N.D. Zahari	O-FIR-139
M.Y. Yahya	P-MFC-109	Z.M. Zain	O-PRO-373
M.Z.A. Yahya	P-MFC-183	K.A. Zainal Abidin	O-PRO-263
M.Z.A. Yahya	O-NAT-135	N. Zainuddin	O-GRE-067
T. Yamada	P-JOI-031	S.Y. Zainuddin	O-MFC-123
R. Yamagishi	O-REP-131	E.S. Zainudin	O-DUR-361
M. Yamane	O-MCM-055	M. Zako	O-NUM-217
H. Yamatsuka	O-NUM-217	M. Zako	O-TXT-165
Z.L. Yan	O-NAT-168	Y. Zamri	P-FRA-073
J.L. Yang	O-FRA-192	D. Zang	O-GCC-331
S.-Y. Yang	O-FRA-222	C. Zhang	O-FRA-162
T. Yang	O-GCC-364	D. Zhang	O-FRA-162
W.D. Yang	O-NAN-322	H. Zhang	O-FWE-052
X.P. Yang	O-NAT-176	H. Zhang	O-FWE-138
Y. Yang	O-NAT-225	H. Zhang	O-GCC-364
Y.Q. Yang	O-SEL-037	J. Zhang	O-ITP-023
X. Yao	O-GCC-364	J.C. Zhang	O-NAN-053
T. Yasuhara	P-NAN-313	M.Q. Zhang	O-NAN-161
L. Ye	O-FRA-162	M.Q. Zhang	O-NAN-370
L. Ye	O-SHM-040	M.Q. Zhang	O-NAT-168
L. Ye	O-TEM-236	S. Zhang	O-NAT-168
B.J. Yeang	P-GRE-248	X. Zhang	O-NAT-252
K.K. Herbert Yeung	O-MEC-336	Z. Zhang	O-SEL-037
Y. Yi	P-FIR-186	Z. Zhang	O-SEL-070
Y. Yi	P-NAN-189	Z. Zhang	O-SEL-262
C.-W. Ying	O-ITP-284	Z. Zhang	O-SHM-040
M.-C Yip	O-FRA-180	Z.D. Zhang	O-FRA-222
M.-C. Yip	O-MCM-158	Z.Y. Zhang	O-GCC-013
T. Yodkaew	O-MCM-210	Z.Y. Zheng	O-NAT-176
Y.H. Yoo	O-SMA-300	A. Zuraida	O-GRE-259
J.H. Yoo,	P-FRA-335	Haftirman	P-FRA-340
A. Yorifuji	O-PRO-146	Haftirman	P-JOI-166
K. Yoshida	P-NAT-112	Haftirman	O-TUB-171
B. Yousif	O-NAT-025		



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