

Proceedings of the First International
Congress on Polymer Concretes

POLYMERS IN CONCRETE

The Concrete Society

Editorial team

D.H. Cohen, *Plastics and Rubber Institution, UK*;
R.C. de Vekey, *Building Research Establishment, UK*;
T.A. Downing, *Imperial Chemical Industries Ltd., UK*;
J. Forrester, *Cement and Concrete Association, UK*;
K. Gamski, *Université de Liège, Belgium*;
A.C. Griffiths, *John Laing Research and Development Ltd., UK*;
L.E. Kukacka, *Brookhaven National Laboratory, USA*;
M. Levitt, *British Precast Concrete Federation, UK*;
A.J. Majumdar, *Building Research Establishment, UK*;
A.M. Neville, *University of Leeds, UK*;
W.O. Nutt, *Associated Portland Cement Manufacturers Ltd., UK*;
D.A. Smith, *Queen Mary College, University of London, UK*;
R.H. Swamy, *University of Sheffield, UK*;
H. Wells, *Atomic Energy Research Establishment, UK*;
A.E. Witchlow, *Cyril Blumfield & Partners, UK*.

The Construction Press

CONTENTS

Section 1 Status Quo v Polymer Worldwide		
1.1	Review of worldwide development and use of polymers in concrete <i>J.T. Dikeou</i>	2
1.2	An assessment of some polymer (PMMA) modified concretes <i>C.D. Pomeroy and J.H. Brown</i>	9
1.3	Recent progress in the field of polymer impregnated concretes <i>A. Rio and S. Biagini</i>	14
	Discussion	22
Section 2 Polymer Impregnated Concrete		
2.1	Polymer impregnated concrete development in the USA <i>L.E. Kukacka</i>	26
2.2	Limits in the modification of characteristics by the transformation of cement concrete into polymer impregnated concrete <i>H. Schorn</i>	31
2.3	The role of polymer in polymer impregnated paste and mortar <i>D.G. Manning and B.B. Hope</i>	37
2.4	Pore structure, mechanical properties and polymer characteristics of porous materials impregnated with MMA <i>K. Hastrup, F. Radjy and L. Bach</i>	43
2.5	The creep of polymer impregnated lightweight concrete <i>M. Gunasekaran and E.H. van Antwerp</i>	54
2.6	Molecular weight of polymer formed in polymer impregnated concrete <i>Y. Ohama</i>	60
2.7	Cement-mortar experiments concerning addition of water dispersible epoxy or furfuryl alcohol systems <i>S. Popovics</i>	64
	Discussion	71
Section 3 Concretes with Polymers added		
3.1	Flexicrete – a low modulus concrete suitable for model studies <i>C.V. Gole and B.N. Divekar</i>	80
3.2	Polymer modified fibre reinforced cement composites <i>B.P. Hughes and J.E. Guest</i>	85
3.3	Polystyrene-foam concrete with special reference to the frost resistance of polystyrene-foam concrete with addition of fly-ash or brick flour instead of quartz sand <i>H. Sommer</i>	93
3.4	The properties of polymer-modified cement pastes <i>R.C. de Vekey</i>	97
	Discussion	105

Section 4		Concretes with Dispersed Polymers added:	
		a) Vinyl Acetate and Copolymers b) Vinyl Propionate	
4.1	Polymer dispersions for cement and concrete		112
	<i>H. Teichmann</i>		
4.2	Synthetic resin dispersions as a mortar and concrete admixture		125
	<i>Dr. Harréus</i>		
4.3	Methods of test for polymer cement mortar		131
	<i>K. Okado, S. Morita and W. Koyanagi</i>		
4.4	Characterisation of vinyl polymers prepared in concrete matrices		137
	<i>F. Arredondo, M.F. Cánovas, J. Fontán, E.L. Madruga and J. San Román</i>		
4.5	Hydration characteristics of premix polymer cement materials		144
	<i>D.J. Cook, D.R. Morgan, R.P. Chaplin and V. Sirivivatnanon</i>		
4.6	Strength of polymer-modified mortars using super high early strength cement		151
	<i>Y. Ohama</i>		
	Discussion		157
Section 5		Concretes with Dispersed Polymers added:	
		c) Vinyls and Acrylics d) Rubbers	
		Concretes with Addition of Water Soluble Polymers	
		Resin Bound Aggregates – with Cements, without Cements	
5.1	The mechanical properties of hydrated Portland Cement pastes modified with an SBR polymer latex		162
	<i>R.L. Bell and R.G. Dingley</i>		
5.2	Concretes with addition of water-soluble plastics as concrete admixtures		168
	<i>H.R. Sasse</i>		
5.3	Epoxy water slurry mortars		174
	<i>I. Makansi and C.E.L. Reader</i>		
5.4	Long life strength polymer concrete		179
	<i>T. Broniewski, Z. Jamrozy and J. Kapko</i>		
5.5	Strength development of cold setting epoxy resin mortars		185
	<i>S. Inoue</i>		
5.6	Durabilities of cold setting epoxy resin mortars		191
	<i>S. Inoue</i>		
5.7	Epoxy adhesives for concrete and steel		195
	<i>F. Hugenschmidt</i>		
5.8	Thermo-dependent properties of polyester resin concrete		210
	<i>K. Okada, W. Koyanagi and T. Yonezawa</i>		
5.9	Resin bound aggregate material systems		216
	<i>R.C. Valore and D.J. Naus</i>		
5.10	Resinous binder concrete		223
	<i>K. Gamski</i>		
5.11	Plastic concretes of furan polymers and some physical properties and applications		230
	<i>N. Goudev</i>		
5.12	Several physical properties of resin concrete		236
	<i>K. Kobayashi and T. Ito</i>		
	Discussion		241
Section 6		Practical Applications	
6.1	Polymer impregnated concrete process techniques and applications		254
	<i>B. Sjøpler</i>		
6.2	Full-scale fabrication and testing of polymer impregnated concrete		262
	<i>G.W. De Puy</i>		
6.3	The work of fracture of concrete and polymer impregnated concrete composites		269
	<i>J.C. Aleszka and P.W.R. Beaumont</i>		

6.4	Development of high strength concrete at early ages using a sulphur infiltration technique <i>V.M. Malhotra, K.E. Painter and J.A. Soles</i>	276
6.5	Some mechanical properties of polymer modified Portland Cement sheets with and without glass-fibre reinforcement <i>H.G. Allen and R.S. Channer</i>	282
6.6	Artificial slates with a resin mortar base <i>A. Aigrot</i>	290
6.7	Properties of polymer modified plain and fibre reinforced concrete <i>P.S. Mangat and R.N. Swamy</i>	296
6.8	Design of polymer-impregnated concrete plant for mass production <i>Y. Ohama, H. Iwasaki, T. Nakajima, T. Katow, S. Kashimura, S. Tachibana and M. Kimura</i>	300
6.9	Fire tests on models constructed of resin concrete <i>H. Suzuki and S. Sugahara</i>	306
6.10	An evaluation of some practical aspects of concrete structural members partially impregnated with polymers <i>A.M. Cooke</i>	312
6.11	Wear-resistance of resin-bound mortar to studded tyres <i>H. Sommer</i>	323
	Discussion	327
Section 7 Further Practical Applications		
7.1	Epoxide resin concrete as a structural material <i>B.W. Staynes</i>	340
7.2	Some engineering implications of design in polymer concrete <i>R.N. Swamy</i>	349
7.3	High strength concretes with synthetic resin and no mineral binding matter and their practical application <i>I. Ionescu and M. Enculescu</i>	360
7.4	Current use and application of polymer cement <i>P. Williams and G.A. Jacobs</i>	367
7.5	Application of a melamine-formaldehyde polymer in concrete <i>B. Davis</i>	375
7.6	“Rigid foam lightweight concrete based on unsaturated polyester resins”: properties and applications in the building industry <i>W. Klöcker and E. Dolfen</i>	378
7.7	Use of polymer modified concrete for strata control in deep level mining <i>L. Wood</i>	397
7.8	Polymer impregnated concrete for highway and structural applications <i>J.A. Manson, W.F. Chen, J.W. Vanderhoff, P.D. Cady, D.E. Kline and P.R. Blankenhorn</i>	403
7.9	Synthetic resin-bound concrete <i>P. Koblischek</i>	409
7.10	Developments in plasticised concrete <i>R.M. Edmeades and P.C. Hewlett</i>	420
7.11	Experience in the use of polymer concrete in the building and construction industry <i>R.D. Browne, M. Adams and E.L. French</i>	433
	Discussion	448
	Summary of the Congress	455