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Abstract book

Oral presentations

Asymmetric synthesis & Catalysis

Takisawa Shinobu	page 33
Antilla Jon	page 34
Tassinari Francesco	page 35
Shibata Takanori	page 36
Michon Christophe	page 37
Benedetti Erica	page 38
Cadart Timothée	page 39
Amedjkouh Mohamed	page 40
Geiger Yannick	page 41
Kawasaki Tsuneomi	page 42
Noorduyn Wim	page 43
Kawabata Takeo	page 44

Fundamentals

Grelet Eric	page 45
Crossley Maxwell	page 46

Chiroptical spectroscopy

Polavarapu Prasad	page 47
Johannessen Christian	page 48
Mori Tadashi	page 49
Merten Christian	page 50
Sonstrom Reilly	page 51
Wada Takehiko	page 52
Zehnacker Anne	page 53
Abbate Sergio	page 54

Chiral polymers & materials

Benincori Tiziana	page 55
Wan Xinhua	page 57
Brandt Jochen	page 58
Hirschmann Max	page 59
Lakhwani Girish	page 60
Michel Marine	page 61
Ernst Karl-Heinz	page 62
Freire Félix	page 63
Maeda Katsuhiko	page 64

Supramolecular chirality & chirality in biology

Okazaki Yutaka	page 65
Donato Monti	page 66
Gonzalez Rodriguez David	page 67
Fischer Lucile	page 68
Van Zee Nathan	page 69
Liu Minghua	page 70
Goldup Stephen	page 71
Tanatani Aya	page 72
Ji-Young Kim	page 73
Le Gac Stéphane	page 74
Kinbara Kazushi	page 75
Raynal Matthieu	page 76

Physical computational

Tuvi-Arad Inbal	page 77
Kessler Jiri	page 78
Yochelis Shira	page 79

Chirality at nanoscale

Markovich Gil	page 80
Huang Zhifeng	page 81
Gellman Andrew	page 82
Gerard Davy	page 83
Valev Ventsislav	page 84
Garzon Ignacio	page 85

Enantioseparations & chiral resolution

Kuroda Reiko	page 86
Mairesse Yann	page 87
Zhang Chunhong	page 88
Ghanem Asgraf	page 89
Slater Ben	page 90
Hamase Kenji	page 91

Poster presentations

P1	Abbasi David	page 93
P2	Abbate Sergio	page 94
P3	Abbinante Vincenzo Mirco	page 95
P4	Abuaf Meir	page 96
P5	Ando Mitsuka	page 97
P6	Andrushchenko Valery	page 98
P7	Arafah Rami	page 99
P8	Arai Midori	page 100
P9	Arai Takayoshi	page 101
P10	Baglai Iaroslav	page 102
P11	Baguenard Bruno	page 103
P12	Batista Jr. Joao M.	page 104
P13	Bednarova Lucie	page 105
P14	Belviso Sandra	page 106
P15	Blasius Jan	page 107
P16	Bloch Etienne	page 108
P17	Bond Caoimhe	page 109
P18	Bornerie Mégane	page 110
P19	Bosson Johann	page 111
P20	Boulloy Alice	page 112
P21	Brehm Martin	page 113
P22	Brotin Thierry	page 114
P23	Buffeteau Thierry	page 115
P24	Choi Yunjeong	page 116
P25	Ciogli Alessia	page 117
P26	Clavier Hervé	page 118
P27	Costil Romain	page 119

Enantioseparation of the four Nadolol Stereoisomers by Fixed-Bed and Simulated Moving Bed Chromatography

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In the last decades, the separation and purification of high added value products by liquid chromatography has been a very popular technique. The development of more stable and efficient stationary phases, together with the design of innovative and more flexible separation processes, enhanced the use of chromatographic processes, particularly at preparative and industrial scales through simulated moving bed (SMB) technology and allied techniques. Nowadays, preparative and SMB related techniques are more and more used in the separation of a wide range of high added value products of interest for the pharmaceutical, fine chemistry, biotechnology and food industries.

In this context, one of the actual main challenges concerns the design and optimization of these chromatographic processes for multicomponent separations. This includes the development of new and innovative chromatographic processes, combining different design strategies and modes of operation, with different types of stationary and mobile phases.

This communication will introduce the multicomponent separation challenge using the commercial pharmaceutical drug of nadolol stereoisomers. The nadolol represents a very interesting case-study of multicomponent chiral separation since it is composed by four stereoisomers, arranged in two pairs of enantiomers. In this way, it introduces the possibility of alternative strategies, using different kind of separation sequences and techniques, the use of different packings (chiral and achiral stationary phases), and the correspondent mobile phase optimization at both normal and reversed phase modes.

An extensive set of experimental results obtained at fixed-bed and SMB operations will be presented. The complete methodology will be explained and applied for the pseudo-binary enantioseparation of the more retained and active stereoisomer (1+2+3)/(4), and for the (2)/(3) and (1)/(4) binary enantioseparations after a first achiral pseudo-binary separation of the two nadolol racemates.

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