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Journal of Chromatography A

journal homepage: www.elsevier.com/locate/chroma

Foreword

Chromatography community has seen major advances in column technology during the last decade as a product of intensive research efforts invested in the preceding years. We have also seen major advances in the characterization of columns and utilization of the state-of-the-art performance. It is remarkable to have a major advance in performance of an analytical instrumentation, and enjoy much faster separations by a factor of as much as an order of magnitude, after the method was once thought matured. It is also surprising that these advances have been brought about by pursuing the approaches that had been thought viable for several decades.

This special issue contains review articles and original research papers dealing with all aspects of high-speed and/or high-efficiency columns consisting of small particles, core-shell particles, and monoliths, including the development and characterization, as well as the high-performance separations obtainable using such columns in various format and under a variety of conditions.

At this point it would be interesting to think about what would be expected to come in the near future. It would certainly be expected that advanced separation media would be developed in accordance with the advances in surrounding instrumentation, particularly a mass spectrometer and a solvent delivery system. Although it is not certain that even smaller particles are going to be used for general-purpose columns, I am sure that the improvement in performance will be possible and be brought about to make the separations even faster. The use of extreme conditions such as high

temperature may need a consideration of its environmental impact, if the approach is widely applicable. Higher performance for biological macromolecules and particles, possibly in their active form, is highly desirable. This subject may be related to the selectivity of packing materials and the stationary phases to detect subtle differences in target structures. As already we have seen the use of small-sized columns, further miniaturization of separation media will be achieved along with the reduction in the extra-column effect caused by a separation-, detection-, and data-handling systems. This subject will depend upon how good is the performance and practical handling of capillary LC systems.

The impressive performance provided by the current materials has convinced a wide range of chromatographers. As the performance reached the extreme and the field of application became diverse, the interest of those practitioners may be far from fundamentals. It will be desirable for the experienced to convey the importance of fundamentals to those entering and using new high-performance materials under extreme conditions for maximum productivity. I owe a lot to the authors as well as the reviewers kindly contributed to this issue, and hope this issue to be useful for those interested in high-performance separations.

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Available online 11 January 2012