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Foreword

It seems to happen to some techniques that when they become passed over in the rush to follow the latest developments in a field they quickly become shrouded in a cloak of invisibility and the general participants in the field soon loose sight of what is going on in a once familiar technique. This seems to be the case in planar chromatography (thin-layer chromatography for the purpose of this special issue) which is rarely represented among the topics for discussion at the larger chromatography symposia these days. Having low visibility does not necessarily translate into stagnation but likely results in limited exposure for those with a vision of how to progress the technique to take on the challenges of contemporary problems. From this perspective, this special issue of the Journal attempts to shed light on some of the developments occurring in planar chromatography and highlight its potential for a new dawn.

Once kinetic performance became the dominant force driving innovation in liquid chromatography then thin-layer chromatography with its reliance on capillary forces with their inadequate capability to drive the mobile phase fast enough and with a constant velocity was soon displaced from the center of attention by high pressure liquid chromatography. Attempts to address this fundamental problem in planar chromatography through forced flow (or overpressured) development were not a commercial success. Modern thinking suggests that in electrochromatography a solution might be found for an instrumentally simple and reliable mechanism for a stable and adequate flow source for planar chromatography. At the same time other workers have focused on the design of the stationary phase, and in particular, the development of miniaturized separation systems capable of high sample throughput using parallel development. In general, miniaturization of liquid chromatographic systems has not been a great success so far, but in these novel stationary phase formats for planar chromatography with their associated instrumentation, there is reason to be optimistic of a revised opinion of the attributes of planar chromatography in the most recent research field in the separation sciences. At a time when porous shell particles are gaining traction for column chromatography their potential to provide the dual benefits of a higher mobile phase velocity and lower plate height in capillary flow systems in planar chromatography should not be lost sight of either.

Practical methods of planar chromatography are frequently associated with samples that can be visualized directly on the layer or easily converted to a suitable derivative. To expand their scope alternative methods of detection are under development that can enhance the flexibility and range of applications in planar chromatography. In this reguard indirect detection methods for compounds lacking a useful chromophore, effect-directed biological detection, and surface sampling interfaces for mass spectrometric detection stand out at present. The ease with which planar methods can be combined with reporter organisms offers a new way for effective sample screening facilitating the identification of samples with attributes of interest, such as toxicity or mutagenesis, competing effectively with the hit and miss approach of target compound analysis. Effect-directed methods pickup general targets while target compound methods only provide information for the targets initially selected. The wider use of planar chromatography in sample screening, where it has a proven advantage in sample throughput and cost savings, requires a more general method for identification of separated substances. This is where the surface sampling interfaces for mass spectrometry are proving essential in reducing the time and effort required to identify unknown compounds and increasingly for sensitive and selective quantification. Such has been the progress made that we can now start to think of TLC-MS as a routine tool.

Even less visible techniques like planar chromatography do not disappear entirely because they have associated with them a set of applications in which they are not easily displaced by more recent methods. For a fast, portable and low coast qualitative analysis of simple mixtures it is hard to beat planar chromatography. Thus, why what is often referred to as conventional TLC, is still what most chemists believe to be the role of TLC in laboratory and field science. There are other applications that demand quantification and/or fingerprinting of complex mixtures for which TLC has been identified as a method of choice or first choice. The inclusion of some of these applications in this special issue highlights the integration of the recent developments in planar chromatography with those of laboratory practice for problem solving.

It is the nature of the scientific endeavor to make progress and the purpose of a scientific journal to document and promote these efforts. With this special issue I hope to have met these goals for planar chromatography and the editor is grateful for the willing response of the contributors who participated in its development.

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