

Preface

Recently, Springer published a monograph entitled: “From Multiscale Modeling to Meso-Science—A *Chemical Engineering Perspective*,” which summarizes three decades of research on mesoscale modeling, mainly in chemical engineering. At the end of the book, the new concept of mesoscience was proposed based on the observed generality of different systems, but was not discussed in detail.

From the feedback of readers, we recognized that the original book helps readers to understand mesoscale modeling and simulation, but does not reveal the whole picture of mesoscience because it only provides a very simple description. In addition, we have further clarified the concept of mesoscience since the publication of the book. It is therefore necessary to publish a brief to extract the most relevant content regarding mesoscience to provide a more comprehensive description of this concept.

Supported by Springer, this brief introduces the evolution of the principle of compromise in competition. We outline how the multiscale modeling of particle clustering in gas–solid systems was developed, verified, extended, and finally generalized into the energy-minimization multiscale (EMMS) principle of compromise in competition for all mesoscale phenomena. In addition, more information on the concept of mesoscience are supplemented with our increased understanding based on new evidence acquired, particularly, the understanding of stability conditions in protein foldings, turbulence, and materials preparations. We hope this brief will allow readers to readily understand the concept that we term mesoscience. If mesoscience can be established as a general interdisciplinary science, it may allow us to overcome many current research challenges. This is the driving force that encouraged us to write first the book and now this brief.

We express our sincere thanks to the authors of the original book and all colleagues in the EMMS group. Special thanks are extended to Springer for the encouragement to write this brief.

Towards Mesoscience

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