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Autore	Miyagawa Akihisa
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Sommario/riassunto	This book shows the availability and potential of the coupled acoustic-gravitational (CAG) field for trace-level biosensing. The proposed detection scheme also allows the evaluation of the kinetics and thermodynamics of the reaction occurring on a single microparticle (MP). This method has wide applicability in important fields, involving not only chemistry but also life, environmental, and medical sciences. The author proposes novel trace-level biosensing based on measurements of the levitation coordinate shift of an MP in the CAG field. The levitation coordinate of the MP in the CAG field is determined

by its density and compressibility. The levitation coordinate shift is induced by the binding of gold nanoparticles (AuNPs) to the MP through interparticle reactions. Therefore, the quantity of molecules involved in the reaction can be determined from the levitation coordinate shift. The author demonstrates the zmol level detection for biotin, DNA/RNA, and organic molecules. In addition, the kinetics and thermodynamics are evaluated for various reactions occurring between the MP and AuNP, such as the avidin-biotin reaction, direct hybridization, sandwich hybridization, and aptamer-target complexation. This book provides a new concept based on the CAG field, in which the extent of a reaction is converted into the levitation coordinate shift, that is, “length.” The proposed method has many advantages over other methods, e.g., high biocompatibility, high applicability, and short analysis time. In addition, because the apparatus used in this study is inexpensive and easy to miniaturize, this method is useful in important practical fields, such as forensic and environmental science and diagnosis. Thus, this book inspires many researchers to apply the present method to their own fields of interest.