Record Nr. UNINA9910452069703321 Evaporative self-assembly of ordered complex structures [[electronic **Titolo** resource] /] / editor, Zhiqun Lin Pubbl/distr/stampa Singapore,: World Scientific Pub. Co., 2012 **ISBN** 1-280-66919-5 9786613646125 981-4304-69-7 Descrizione fisica 1 online resource (395 p.) Altri autori (Persone) LinZhigun Disciplina 547.2 Soggetti Solubility **Polymers** Colloids DNA Electronic books. Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Note generali Description based upon print version of record. Nota di bibliografia Includes bibliographical references and index. Nota di contenuto CONTENTS: Preface: 1. Drying a Sessile Droplet: Imaging and Analysis of Transport and Deposition Patterns; 1.1. Introduction; 1.2. The Basic Droplet-Drying Phenomenon; 1.3. Mathematic Models; 1.3.1. Droplet shape: 1.3.2. Governing equations: 1.3.3. Boundary conditions: 1.3.3.1. Mass transfer in the vapor phase; 1.3.3.2. Heat transfer in droplet and substrate; 1.3.3.3. Momentum transfer; 1.4. Vapor Phase Transport; 1.4.1. Analytical solutions; 1.4.2. Finite element analysis; 1.5. Height-Averaged Radial Velocity; 1.6. Full Flow Solution without Marangoni Effect 1.6.1. The derivation of the flow field1.6.2. Finite element analysis; 1.6.3. Comparison between finite element and analytical solutions; 1.6.4. Application to deposition and stretching of DNA; 1.7. Full Flow Solutions with Marangoni Effect; 1.7.1. Expressions for the velocity field with a thermal Marangoni stress boundary condition; 1.7.2. General expressions for the velocity field with Marangoni stresses; 1.7.3. Full analytical solutions; 1.7.4. Temperature field; 1.7.5. Velocity field; 1.7.6. Surface-active contaminants: 1.7.7. Marangoni stress reverses

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Sommario/riassunto

The use of spontaneous self-assembly, as a lithographic tool and as an external field-free means to construct well-ordered and intriguing patterns, has received much attention due to its ease of producing complex, large-scale structures with small feature sizes. An extremely simple route to highly-ordered, complex structures is the evaporative self-assembly of nonvolatile solutes (e.g., polymers, nanoparticles, carbon nanotubes, and DNA) from a sessile droplet on a solid substrate. To date, a few studies have elegantly demonstrated that self-organized nanoscale, microscale, and hierarchically