

計算材料力學實驗室



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研究介紹： 裂紋擴展與枝晶型態是工程學及材料科學上重要的研究議題。實驗室針對此類複雜系統，建構理論模型與數值計算方法，藉助圖形處理器的平行運算處理，能有效率模擬和實驗尺度相仿的系統，研究成果能夠增進我們對其生長機制及穩定性的了解。

研究方向：

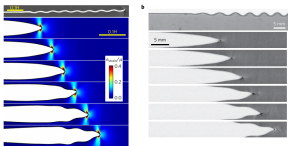
- 動態裂紋穩定性與仿生材料增韌機制
- 鋰電池中枝晶生長及穩定性

代表著作：

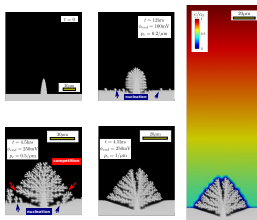
- Y. Lubomirsky, C.-H. Chen, A. Karma and E. Bouchbinder, Universality and Stability Phase Diagram of Two-Dimensional Brittle Fracture. *Physical Review Letters*, 121(13), 2018.
- C.-H. Chen, E. Bouchbinder, and A. Karma, Instability in dynamic fracture and the failure of the classical theory of cracks. *Nature Physics*, 13(12), 2017.
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- C.-H. Chen, T. Cambonie, V. Lazarus, M. Nicoli, A. Pons, and A. Karma, Crack Front Segmentation and Facet Coarsening in Mixed-Mode Fracture. *Physical Review Letters*, 115(26), 2015.

計算材料力學實驗室 - 研究介紹

Fracture Stability in Hyperelastic Materials: (a) Simulations of brittle tensile fracture illustrating the onset of the oscillatory instability and (b) the corresponding experimental observations in brittle gels.



Dendrite Formation in Lithium Metal Batteries: Uncontrollable dendrite formation in lithium metal batteries often leads to poor performance and short-circuit issue. Dendrite nucleation, interdendritic competition and morphologies are investigated in simulations.



Three dimensional fracture stability: In situ microscope images (a)–(g) of fatigue cracks in Plexiglas at different stages of crack advance in mixed-mode loading depicted schematically in (h) and corresponding example of crack front segmentation in phase-field simulation (i).

