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：

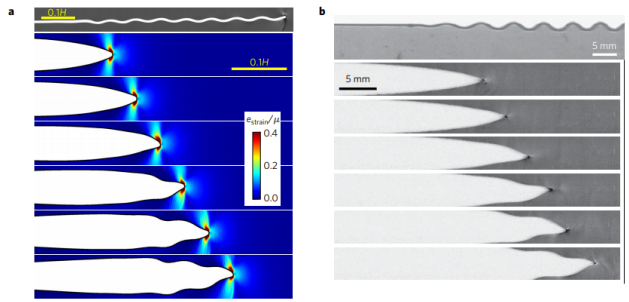
- 動態裂紋生長及穩定性
- 鋰電池中枝晶生長及穩定性

代表著作：

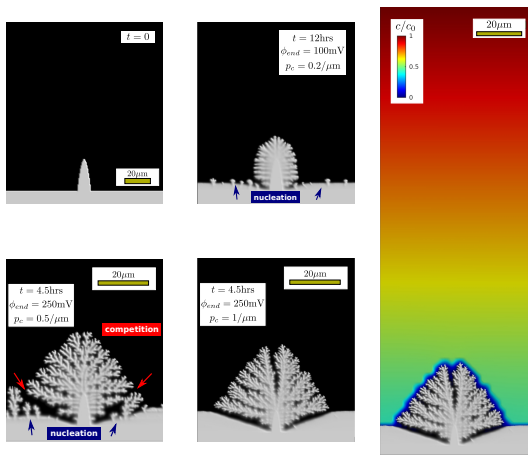
- Y. Lubomirsky, C.-H. Chen, A. Karma and E. Bouchbinder, Universality and Stability Phase Diagram of Two-Dimensional Brittle Fracture. Physical Review Letters, 121(13), 2018.
- C.-H. Chen, E. Bouchbinder, and A. Karma, Instability in dynamic fracture and the failure of the classical theory of cracks. Nature Physics, 13(12), 2017.
- G. Zimmermann, L. Sturz, [and 25 others, including C.-H. Chen], Columnar and equiaxed solidification of Al-7wt.%Si alloy in reduced gravity in the frame of the CETSOL project. JOM, 69(8), 2017.
- 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).