

**PROCORE - FRANCE/HONG KONG JOINT RESEARCH SCHEME
COMPLETION REPORT**

Project Reference Number

F-HK32/10T

Project Title

Experimental study of diffusion and phase behavior of ellipsoidal colloids in two dimensions

Particulars

	Hong Kong team				French team			
Name of Project Co-ordinator (with title)	English: Prof. Yilong Han Chinese: 韓一龍				Prof. Maurizio Nobili			
Name of Co-Investigator (if any)	English: Chinese:							
Institution or Institutional affiliation	<input type="checkbox"/>	CityU	<input type="checkbox"/>	HKU	<input type="checkbox"/>	CEA	<input type="checkbox"/>	INRA
	<input type="checkbox"/>	CUHK	<input checked="" type="checkbox"/>	HKUST	<input type="checkbox"/>	CNRS No.	<input type="checkbox"/>	INRIA
	<input type="checkbox"/>	HKBU	<input type="checkbox"/>	LU	<input type="checkbox"/>	INFREMER	<input type="checkbox"/>	INSERM No.
	<input type="checkbox"/>	HKIEd	<input type="checkbox"/>	PolyU	<input checked="" type="checkbox"/>	University of Others:	Montpellier II	
Other project team members (if any)								

Funding Period

	1 st year	2 nd year (if applicable)
Start Date	01/01/2011	01/01/2012
Completion Date	31/12/2011	31/12/2012

Objective(s) as per original application

1. To study the Brownian dynamics of a single ellipsoid in an external field
2. To study the dynamics and phase behavior of ellipsoids in two-dimensional confinement

[Please attach relevant document(s)]

i) Outline of proposed research and results obtained

We proposed to study the dynamics such as diffusion in monolayers of ellipsoids with or without electric fields. We obtained fruitful results on the structure and dynamics of dense ellipsoids in monolayers. We discovered a novel two-step glass transition: orientational motion become jamming at low density, while translational motion get jammed at high density. Our recent further research show surprising connections between structure and dynamics in glass composed of ellipsoids. These results will be submitted to Nature.

ii) Significance of research results

The results provide new understanding about glass transitions in systems composed of non-spherical particles. This result was published on the top physics journal Physical Review Letters (PRL): Glass transitions in quasi-two-dimensional suspensions of colloidal ellipsoids, Z. Zheng, F. Wang and Y. Han*, Phys. Rev. Lett. 107, 065702 (2011) This paper is highlighted by Editor's Suggestion and reported by Physics view point. Usually 2 out of 70 PRL papers per issue are highlighted like this. I was invited to present this result in one of the world leading conference on glass transitions at Sendai, Japan in 2012: The 4th International Symposium on Slow Dynamics in Complex Systems.

The recent results demonstrate two novel connections between structure and dynamics that has been intensively search by many scientist in the past a few decades. We will submit it soon.

iii) Research output

Glass transitions in quasi-two-dimensional suspensions of colloidal ellipsoids, Z. Zheng, F. Wang and Y. Han*, Phys. Rev. Lett. 107, 065702 (2011)

Glass transitions in monolayers of colloidal ellipsoids, Zhongyu Zheng* and Yilong-Han*, AIP Conf. Proc. 1518, 153 (2013) (acknowledge our French collaborator and this travel grant)

Structural signatures of dynamic heterogeneities in monolayers of colloidal ellipsoids, manuscript in preparation for Nature.

iv) Potential for or impact on further research collaboration

In the future, we will introduce different interactions between ellipsoids and study their glass transition behaviours. The French group has the expertise to assemble ellipsoids at air-water interface, and could be used as a new sample system to explore the two-dimensional glass transitions.