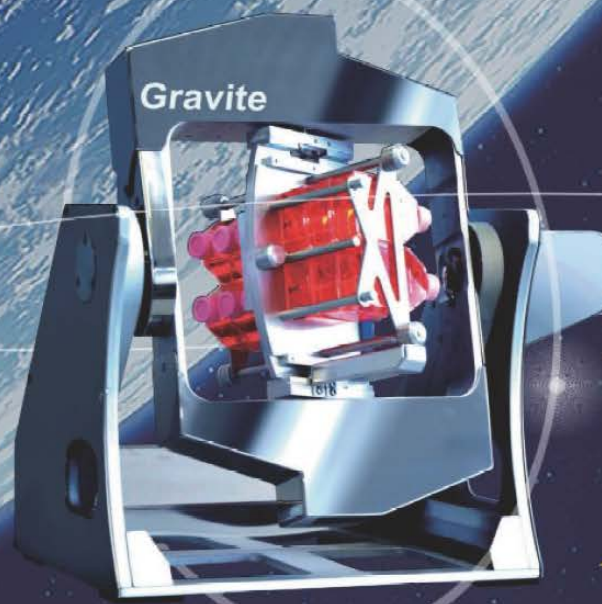


# Gravity controller **Gravite**®

**NASA Kennedy Space Center introduced  
a gravity controller "Gravite®" for simulated microgravity device.**



## **GET THE UNIVERSE IN YOUR LAB.!!**

**Regenerative medicine, Space biology, Drug discovery, etc.**

# 重力控制系统



亚速旺 (上海) 商贸有限公司北京分公司

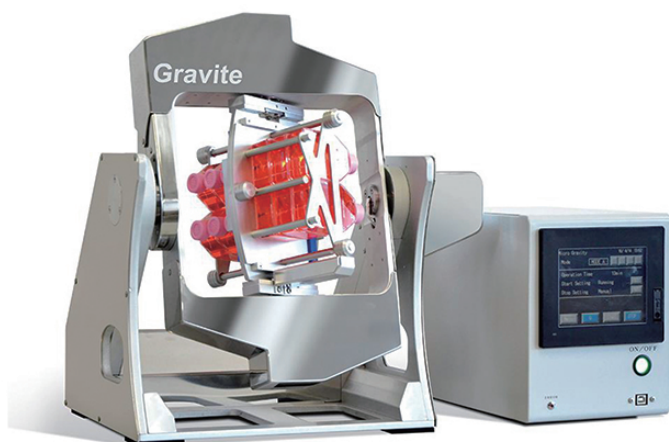
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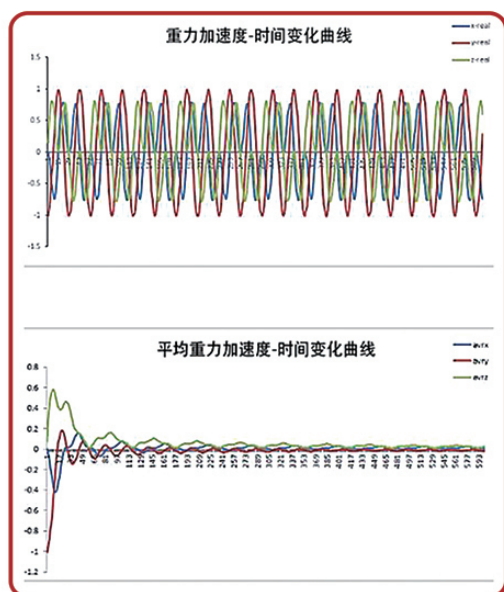
# Gravite Controller 重力控制系统

提供失重环境模拟、超重环境模拟



重力控制器“Gravite®”是一个三维旋转仪。Gravite®有两个旋转轴，可实现样品的三维旋转，使单向重力向不同方向发散，形成模拟微重力环境，平均重力可达到 $10^{-3}G$ 。Gravite®上安装有加速度传感器，可以直观地观察重力环境的变化，并实时监测加速度值。此外，Gravite®不仅可以模拟微重力环境，而且可以利用单轴旋转产生的离心力来创造超重环境。

The Gravite® generates a simultaneous rotation on two axes with constant angular speed. At the center of the rotating frames, the Gravite® cancels the cumulative gravity at the center of machine that simulates microgravity environment of  $10^{-3} G$ . This is accomplished to scatter the gravitational vector identically within a spherical boundary.



## 1、微重力：

Gravite®通过两轴同时旋转，在设备的中心产生 $10^{-3}G$ 微重力

## 2、超重力：

Gravite®通过单轴旋转，可产生2-3G的超重力

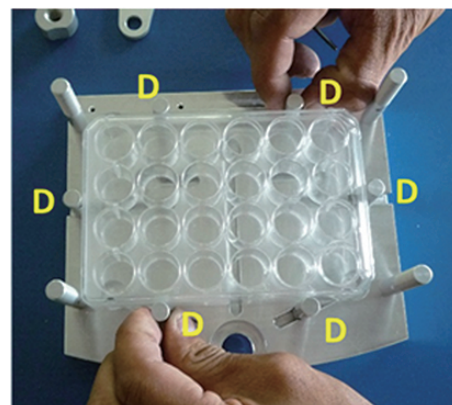
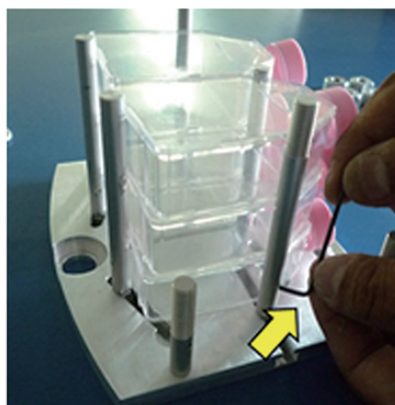
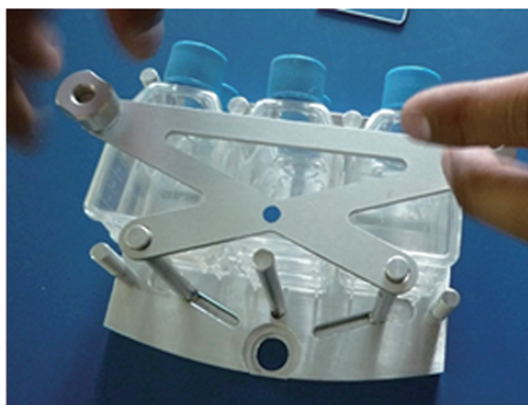
## 3、实时监控

Gravite®安装有重力加速度传感器，可以实时监控重力情况。

## 4、细胞培养环境

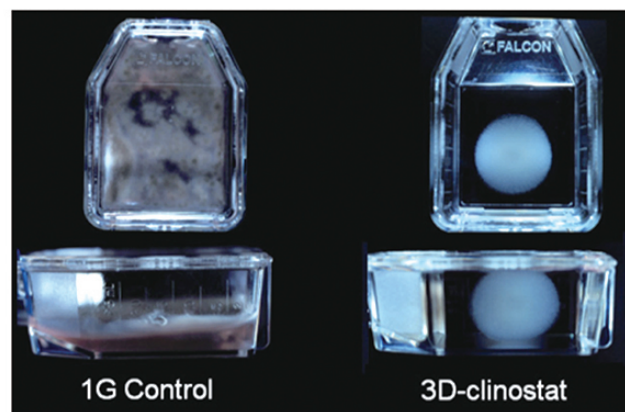
Gravite®可以放置在二氧化碳培养箱中进行细胞培养。

Gravite®使用方便，安装简单，通用的培养瓶即可培养细胞，无需昂贵的耗材。



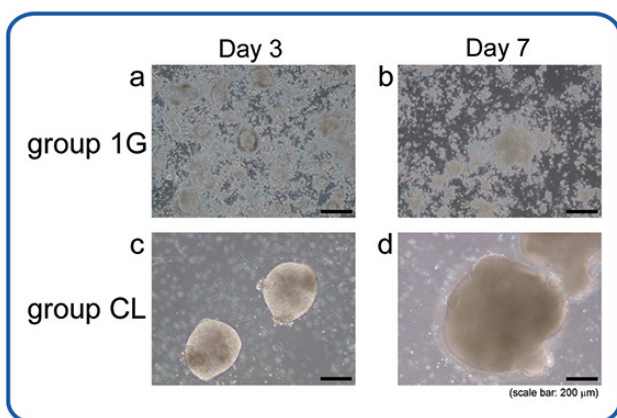


Gravite®重力控制系统可有效地应用于干细胞培养与研究领域



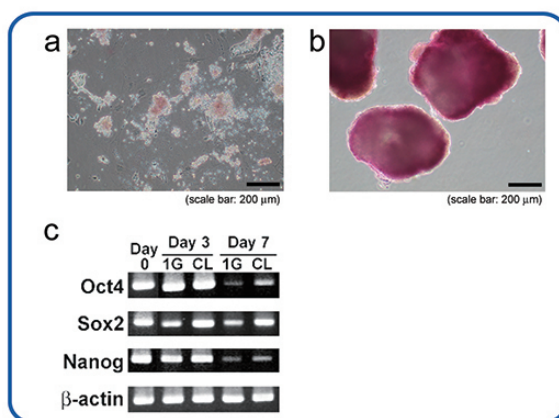
霉菌在Gravite®微重力环境下培养后呈球形  
molds cultured in the Gravite grow in a globular shape rather than a carpet-like shape under the conventional 1G condition

广岛大学Yumi Kawahara教授等，在Gravite®提供的模拟微重力条件下，无培养层无血清（feeder-free and serum-free ESF-C media without LIF）中培养小鼠胚胎干细胞，经过7天的培养，小鼠胚胎干细胞仍保持多能性。



Morphological changes of cultured mouse ES cells on Day 3 and 7.

All the cells became oval cell shapes and flattened, the phenotype of differentiated ES cells in group 1G (a, b). The cells of group CL showed the formation of cell spheres (c, d).



ALP staining of group 1G (a) and group CL (b), on Day 7.

The cell spheres of group CL were positive for ALP. The cells of group CL expressed undifferentiated cell markers (c).

## Gravite®重力控制系统在美国NASA肯尼迪空间中心实验室投入使用

National Aeronautics and Space Administration  
Kennedy Space Center  
Kennedy Space Center, FL 32899



Sept. 26, 2016

UB-A

Professor Rui Yuge  
Graduate School of Biomedical & Health Sciences  
Hiroshima University  
Space Bio-Laboratories Co., Ltd.  
1-2-3 Kasumi Minami-ku,  
Hiroshima, 734-0037, Japan

Dear Professor Yuge,

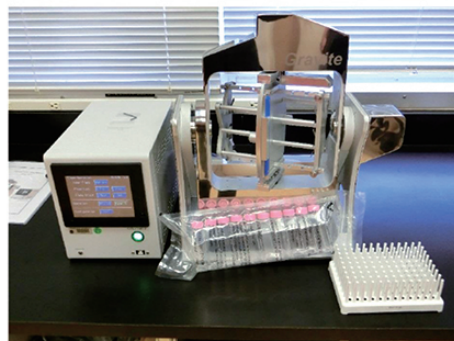
National Aeronautics and Space Administration (NASA) is establishing a capability to support visiting scientists for short duration studies at Kennedy Space Center (KSC) for hypothesis-driven Space Biology research proposals designed to address gaps in current knowledge of how life responds to conditions of altered gravity as provided by microgravity simulation devices. Researchers may use a diverse group of cells, tissues and model organisms. The goal is to produce new knowledge that will provide a foundation on which other NASA researchers and engineers can build approaches and countermeasures to the problems confronting human exploration of space, or, that translate into new biological tools or applications on Earth.

Pursuant to this objective, 3-D clinostats have been identified as a key component of the suite of microgravity simulation devices to be provided to the Space Biology community. We here at KSC early on identified the Space Bio-Laboratories' Co., Ltd. GRAVITE as one of the first such devices to be purchased for these activities based upon its ability to provide simulated microgravity ( $<10^{-6}$  g), partial gravity, and hypergravity (to 2-3 g).

We very much appreciate your assistance in the procurement and operation of the newest generation of GRAVITE, and can confirm that to date it has met with all of our expectations. We anticipate that it will continue to meet all of its specifications and contribute to NASA's research program for years to come.

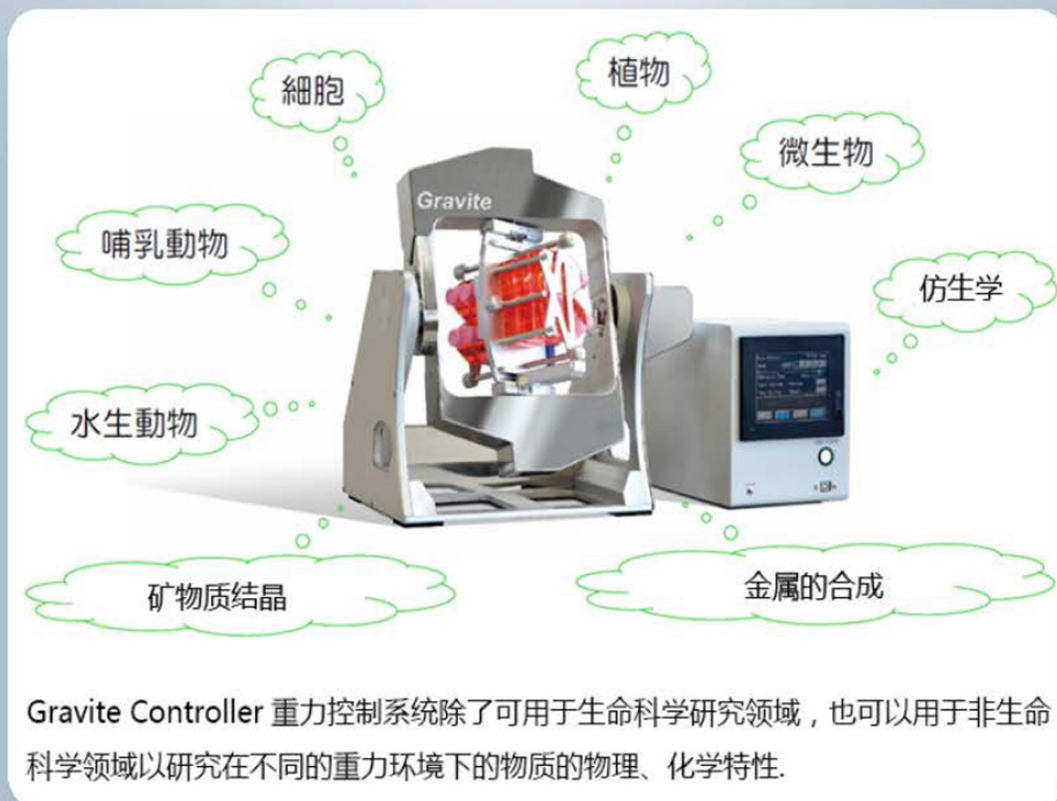
Sincerely,

Howard G. Levine, PhD  
Chief Scientist  
Utilization and Life Sciences Office  
Exploration Research and Technology Programs  
Mail Code: UB-A  
Kennedy Space Center, FL 32899, USA





# Gravity controller **Gravite**®



## 仪器参数:

回转器主体、可触摸控制器（控制回转器模拟微重力/超重力环境）、透气型培养瓶搭载器、电源线等。

1. 回转器模拟微重力环境 $<10^{-3}G$ ;
2. 模拟超重力环境 $\geq 2G$ ，且最大可达 $3G$ 。
3. 微重力条件下转速可分档触屏操控，精度 $\pm 1rpm$ ;
4. 超重力条件下加速度可分档控制，精度 $\pm 0.001G$ 。
5. 可在X、Y、Z三个方向监测重力环境，并实时了解模拟环境的平均重力变化。
6. 回转器主体需能放入恒温箱，提供体外细胞培养必需的湿度、5%  $CO_2$ 浓度及 $37^{\circ}C$ 环境;
7. 细胞培养装置搭载架能够根据实验需求进行大小调节;
8. 适用于不同大小细胞培养瓶及培养皿。

体积(W × D × H) : 425 × 420 × 445 (mm)

重量: 13.5Kg

电源: AC120V/60Hz



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