



Collective Molecular Dynamics of a Floating Water Bridge

June Wu
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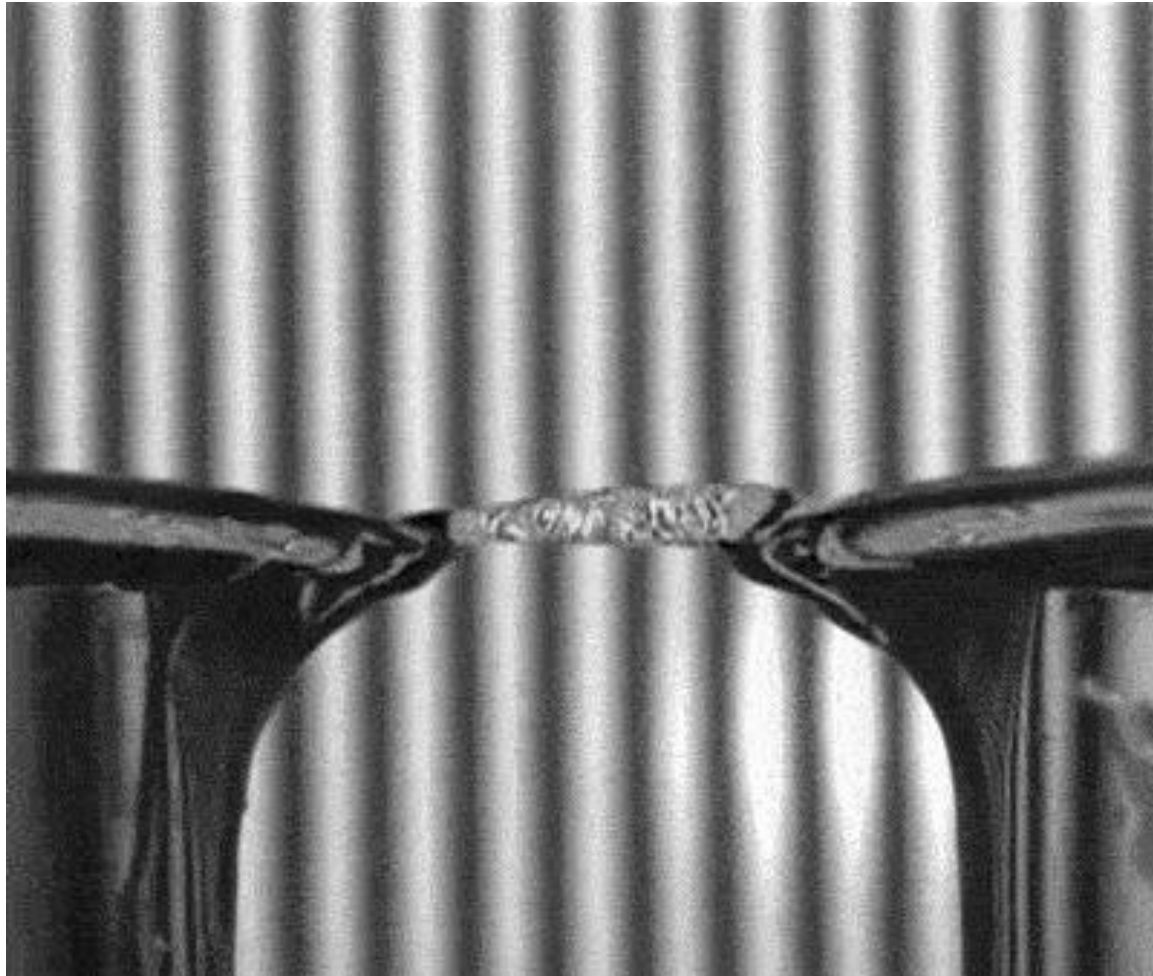


Floating Water Bridge(FWB)

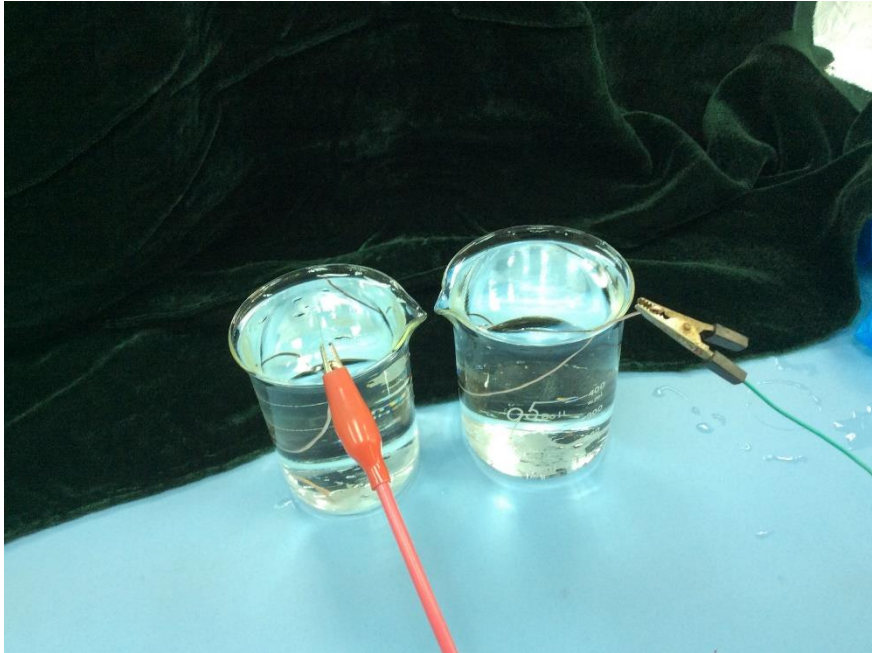
原理： 两个装满去离子水的烧杯彼此接触，如果此时给它们之间加上数千伏的电势差，那么即使把两个烧杯拉开几厘米距离，二者之间也依然会有一条“水桥”相连。这一现象的具体原理还有待进一步研究，目前普遍认为它是和表层液体发生极化有关。

<http://www.guokr.com/article/440051/>

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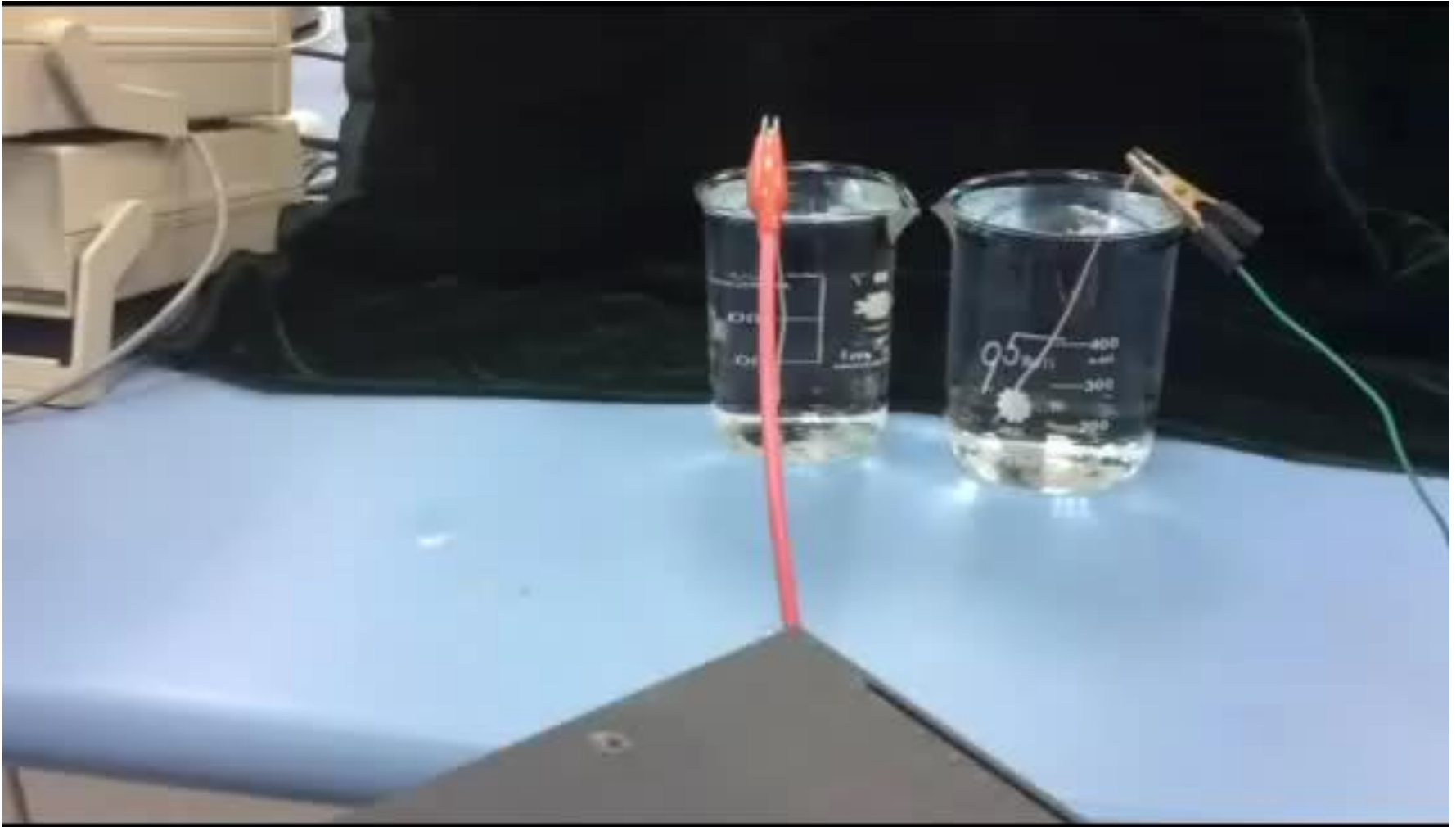
- 在进行探究摸索实验期间，对去离子水前几次加高压可以产生明显水桥现象；
- 但是加高压若干次后不会产生水桥，只会进行放电现象；
- 无法自动出现水桥现象，需要人为地推动水杯才会出现。

实验现象记录

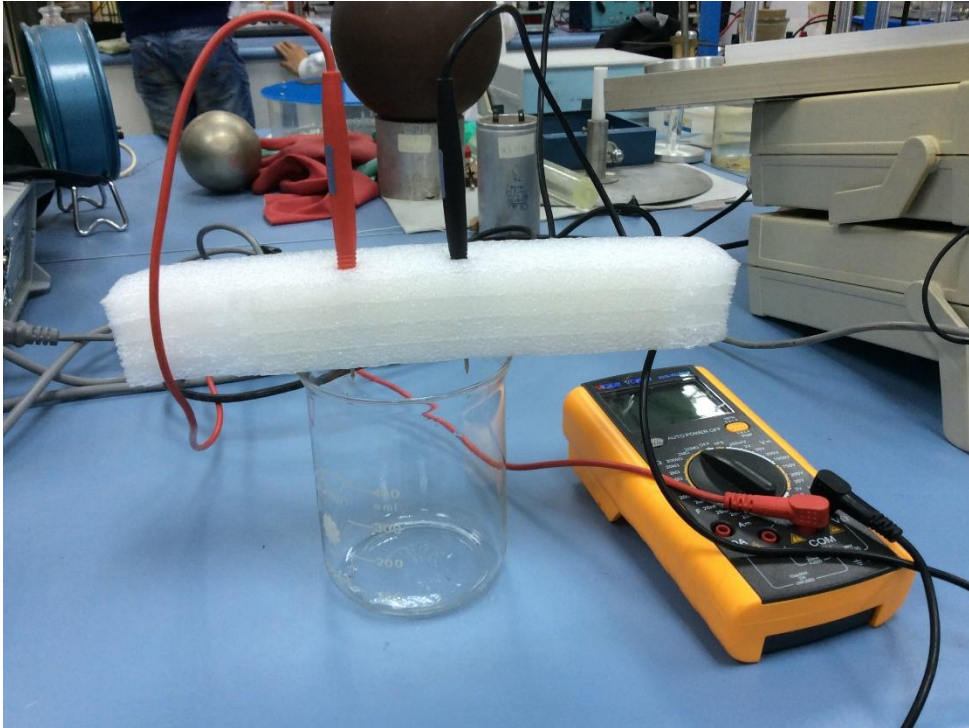
Week 1

2015-4-13

Floating Water Bridge(FWB)



Floating Water Bridge(FWB)



去离子水在实验室环境
下静置一周后测量电阻
 $R=1.32\text{M}\Omega$ ($20\text{M}\Omega$)
 $L=52.50\text{mm}$ (游标卡尺,
 0.02mm)

自来水电阻
 $R=2.67\text{M}\Omega$ ($20\text{M}\Omega$)

实验现象记录

Week 2

2015-4-20

Floating Water Bridge(FWB)

改进： 烧杯垫高，保持烧杯嘴水面一样高。

现象：

- 不用再推一下即可出现水桥；
- 前面接近10-20次放电，均没有明显水桥现象，与放电现象混在一起，无法区分；
- 在经历约20次放电现象之后开始出现预期现象——水流从左杯口呈细线状从左上至右下，然后再形成一道稳定的水桥架在两杯口之间，非常成功，经历时间大约2秒，至少重复出现3次以上。

实验现象记录

Week 3

2015-4-27

Floating Water Bridge(FWB)



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试验参数

- 两烧杯杯口距离：1.150cm
- 直流高压：13.38kV

测电阻

- 实验结束之后，约经历30次放电之后
- $R=2.10\text{M}\Omega(20\text{M}\Omega)$

实验现象记录

Week 3

2015-4-27

Floating Water Bridge(FWB)

Collective Molecular Dynamics of a Floating Water Bridge

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Summary

When a high voltage is applied to pure water filling two beakers kept close to each other, a connection forms spontaneously, giving the impression of a floating water bridge. This phenomenon is of special interest, since it comprises a number of phenomena currently tackled in modern water science. The formation and the main properties of this floating water bridge are analyzed in the conceptual framework of quantum electrodynamics. The necessary conditions for the formation are investigated as well as the time evolution of the dynamics. The predictions are found in agreement with the observations.

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计划安排：

- 继续探究水桥的形成条件，具体从电压、杯口距离、容器材质等方向入手；
- 查询文献，比较并对目前流行的几种说法作出综述；
- 重复试验现象，规范实验操作过程；
- 对水桥的形状作出分析；
- 对其他感兴趣的课题进行选择性地跟进和研究。

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Thanks

Q&A