

flask culture. JMU-MVP14 strain got the highest astaxanthin production 24.32 mg/L and JMU-7B12 strain got the lowest astaxanthin production 0.93 mg/L in the four strains, respectively. At the same time, JMU-17W strain got the highest biomass 8.13 g/L and JMU-MVP14 strain got the lowest biomass 3.20 g/L. Then, the effects of adding different carbohydrate metabolic products on cell growth and astaxanthin production was compared between JMU-668 strain and JMU-MVP14 strain. Lactic acid, ethanol and citric acid all effectively increased biomass amount and astaxanthin concentration of JMU-668 strain. Biomass amount of JMU-668 strain was reduced, and astaxanthin concentration was increased compared with the control, When added glycerol. Then, biomass amount of JMU-MVP14 strain and astaxanthin concentration were promoted (no obvious), when added lactic acid, ethanol and glycerol. And acetic acid show positive effect on biomass amount of JMU-MVP14, and side effect on astaxanthin production. In addition, citric acid showed side effect on biomass amount of JMU-MVP14. Furthermore, when cultivated in high concentration of glucose, astaxanthin concentrations of two strains were promoted. Moreover, the effects of cultivating in low dissolved oxygen condition on cell growth and astaxanthin production was compared with high dissolved oxygen condition. Astaxanthin production of JMU-668 strain cultured in low dissolved oxygen condition was increased by 47.2% compared with the high dissolved oxygen condition. On the contrary, astaxanthin production of JMU-MVP14 strain was remarkably suppressed in low dissolved oxygen condition.

Key words *Phaffia rhodozyma*; astaxanthin; shake-flask culture; carbohydrate metabolic products; metabolic analysis

信息窗

“气味屏幕”可随食物图像传递气味

据物理学家组织网4月1日报道,东京农业和科技大学的研究人员开发出可传递气味的屏幕技术,能准确定位液晶显示屏幕上的食物图像并散发出该食物的气味,增强显示画面现实的效果。该技术近日在美国佛罗里达州奥兰多市举办的美国电气和电子工程师协会(IEEE)虚拟现实会议中亮相。

该研究团队的演示题目是“气味屏幕”,即在液晶显示屏上提供虚拟的气味源。研究人员说,“气味屏幕”是一种全新的嗅觉显示屏,可以在一个二维显示屏幕上生成一个定位气味分配。虽然用户会感觉到气味来自于屏幕上的特定区域,但虚拟气味源的位置在屏幕上可任意变换。用户可以将“鼻头”在屏幕前自由移动,体验“气味强度随着嗅探位置的虚拟变化”。例如其会直接依据在屏幕上出现的1个新鲜桃子或1杯热气腾腾咖啡的图像,传递给用户桃子或咖啡的气味。

研究人员解释说,该技术的关键点在于,遍布在显示屏上4个角落的凝胶颗粒,会随着空气流动而散发出气味,气流可以随着风向变换强度和方向,用户就可以体验到不同位置的气味强弱。

先进机械系统工程部副教授石田宏说:“‘气味屏幕’通过控制气流提供了一个虚拟的气味源,该屏幕在实际中会有很多应用。”比如,目前超市在食物促销时,会尝试释放食物的味道。大多数情况下,通过电风扇吹出气流,让食物的气味在超市流动,“引诱”消费者关注相关食物。现在有了“气味屏幕”这种吸引客户的更有效方法,只需在显示屏上提供食物图像,显示屏就会散发食物的气味,更能吸引消费者的兴趣和关注,以达到促销目的。

(消息来源:科技日报)