TEXAS STATE UNIVERSITY

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Title: Gas Hydrates with a High Capacity and High Formation Rate Promoted by Biosurfactants.

Background: Gas hydrates are solid structures comprised of natural gas molecules trapped in frozen water. They are naturally occurring, usually in extreme environments, and have the appearance of packed snow or ice. They are a concentrated form of natural gas comparable to compressed gas, but not as concentrated as liquefied natural gas. Estimates suggest that a significant part of the Earth's fossil fuel is stored as gas hydrates. Research to better understand how natural gas hydrates form and how they could be used as a future source of natural gas is rapidly gaining momentum. Researchers attempting to generate gas hydrates in the lab have found that the formation rate is too slow to be economically feasible. Hence, focus on improving the interfacial contact between liquid water and gas molecules has been targeted to overcome this problem. Although a number of related methods have been reported, significant advancement in this area is still needed to approach the US DOE target for methane storage and transportation.

Invention Description: Inventors have developed high capacity lignosulfonate (LS) gas hydrates and a faster rate forming method for forming LS gas hydrates with a variety of gases. The invention also provides a method of producing energy from LS gas hydrates and for releasing gas LS gas hydrates. The higher formation rate than other gas hydrate formation methods, the high storage capacity of the LS gas hydrates and the sustainable nature of lignosulfonates are all important characteristics that make this invention ideal for gas hydrate energy production.

Benefits: Natural gas is estimated to represent more than 20% of the world’s energy consumption, and although natural gas hydrates is naturally occurring and prevalent in the environment, recovery from gas hydrates is challenging because they are often found in extreme environments. This invention provides a significant step towards economic feasibility of producing gas hydrates for energy production, which some believe will become a viable source of valuable gases such as methane.

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