A New and Cost-Effective Technology to Produce Hybrid-Glass/Optical Bubble Probes

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BACKGROUND

The ability to accurately quantify gas volumes in liquid flows has important applications in environmental science and industry. For example, environmental processes that significantly contribute to changes in earth's climate, such as methane seeps from the sea floor and the exchange of gases between the ocean and atmosphere at the sea surface, demand precise sensors that are small and sensitive enough to measure the ratio of liquids and gases in these bubbly mixtures. These measurements also play a critical role in the operational efficiency of a wide variety of different engineering processes. Applications include, the monitoring the optimal amount of bubbled oxygen in the treatment of waste water and sewage, and the oil and gas industry, especially in undersea oil pipelines in the Gulf of Mexico alone, have spent billions of dollars annually on added refinement techniques to remove seawater that could be preventable if sensors were able to measure the ratio of crude oil, seawater and gas as the mixture is pumped through pipelines. These challenges exist in both research and industry because the current manufacturing process for making the needed gas/liquid probes have significant cost constraints. Clearly, there is a need for a new and cost-effective technology to produce these probes.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have developed a novel sensor system for measuring entrained gas volumes within liquid flows. The inventors have developed a scalable sensor system that can allow arrays of probes for very accurate real-time monitoring of flows with a per sensor cost of about 10% that of the leading company in the space. As a result, the novel manufacturing process breaks the traditional economic barriers of gas/liquid measurement and could accelerate the growth of this niche market.
The new technology incorporates several parts and fabrication techniques: the manufacture of a glass fiber sensing tip, the bonding of a manufactured tip onto a plastic fiber, and incorporation of the hybrid probe into electronic instrumentation for use as a sensor.

APPLICATIONS

There is a large industry that requires instrumentation for the monitoring of two-phase (gas/liquid) flows including:

- Oil / gas industry – in the refining process and monitoring pipeline flows
- Bio and Chemical reactors – where bubbles are used for mixing
- Food industry - (wine, champagne, beer) need to monitor bubble and foam formation
- Environmental engineering - water plants, waste treatment facilities, fish farming
- Research industry - (medical, oceanographic etc.) the study of bubbles and air/liquid interfaces for science

ADVANTAGES

The current invention produces repeatable probes at a fraction of the cost of presently available commercial systems.

STATE OF DEVELOPMENT

A prototype has been developed and has generated data during studies in marine settings. Additional work will be required for the commercial market.

INTELLECTUAL PROPERTY INFO

The technology is available for licensing.

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OTHER INFORMATION

KEYWORDS

gas volumes in liquid flows, sewage, oil and gas, glass/optical sensor, environmental processes, methane

CATEGORIZED AS

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