



## Luna Develops Unique High-Resolution Rock Stress Measurement Concept

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*Technology creates continuous strain profiles with microscopic detail that increases the safety and production efficiency of subsurface oil and gas systems*

ROANOKE, Va.--(BUSINESS WIRE)--Oct. 15, 2020-- Luna Innovations Inc. (NASDAQ: LUNA) today announced that, working in partnership with Shell's GameChanger™ early-stage-technologies program, it has developed an innovative concept for measuring in-situ stresses in subsurface rock using its fiber optic sensing solutions. When deployed, this technique would provide critical measurements with unmatched consistency and depth resolution, allowing safer and more efficient well operations.

Businesses that rely on underground operations, such as the petroleum and geothermal industries, require accurate estimates of in-situ stress, which refers to the existing pressure that exists underground before a hole is drilled. This affects drilling, surveying, and fluid injection (hydraulic fracturing, water flooding, CO2 sequestration) as well as phenomena such as fault re-activation and induced seismicity.

The new technology, Luna's Continuous Horizontal In-situ Stress Logger (CHISL), uses Luna's high-definition fiber optic sensing (HD-FOS) and ODISI® product to obtain direct, high-resolution strain measurements of induced micro-fractures and borehole deformation. New algorithms then process the strain measurements at the borehole to estimate in-situ maximum and minimum horizontal stress and their orientations.

"The development of this new technology -- using existing Luna fiber optic sensors and our ODISI instrument -- lets the oil & gas industry assess critical parameters that have otherwise been unmeasurable," said Scott Graeff, President and Chief Executive Officer of Luna. "We greatly appreciate Shell GameChanger for its support as well as its expertise with use cases in the oil & gas industry. Together, we show how the industry's toughest test, measurement, and analysis challenges can be tackled with ideas like CHISL."

Luna's CHISL sensor integrates fiber optic sensors into a flexible hydraulic sleeve, which applies pressure to a borehole wall until small longitudinal fractures are formed. Unlike hydraulic fracturing, where fluid flows into the fractures and causes them to grow in length away from the borehole, CHISL does not allow the fluid to flow into the induced fractures.

"A reliable estimate of in-situ stress is critical for many applications in oil and gas industry. For example, the success of hydraulic fracturing in shales greatly depends on the created fracture height, which in turn is strongly controlled by the stress variations with depth. Luna's technology would allow stress depth profiles to be estimated with unprecedented resolution," commented Alexei Savitski, Geomechanics Subject Matter Expert at Shell. "The maximum horizontal stress is one of the most uncertain subsurface properties and is usually inferred from other data. But CHISL would allow this uncertainty to be reduced significantly, which is critical for assessing the risks of fault re-activation and induced seismicity."

The CHISL sensor will provide new kinds of data that can be leveraged to increase safety, production efficiency, and optimization of future subsurface engineered systems. Future field operations using a ruggedized sensor could yield in-situ stress measurements for unprecedented lengths of boreholes and in less time than traditional hydraulic-fracturing techniques. Apart from the stress profiling of rock formations for planning of hydraulic fracturing, other applications include caprock integrity sensing for oil wells and optimized drilling of complex oil wells.

### **About Luna**

Luna Innovations Incorporated ([www.lunainc.com](http://www.lunainc.com)) is a leader in optical technology, committed to serving its customers with unique capabilities in high-performance, fiber-optic-based sensing, measurement, testing and control products for the aerospace, transportation, infrastructure, security, process control, communications, silicon photonics, defense, and automotive industries, among others. Luna is organized into two business segments, which work closely together to turn ideas into products: Lightwave and Luna Labs. Enabling the future with fiber, Luna's business model is designed to accelerate the process of bringing new and innovative technologies to market.

### **About Shell GameChanger™**

[Shell GameChanger](#)™ is a program that seeks to deliver high-impact energy technology through collaboration with startups. For more than 20 years, it has helped numerous startups to get the funding and expert support they need to grow. In recent years, GameChanger™ has strategically focused on technology development that speeds up Shell's energy transition effort, including forming strategic alliances with various incubators, academic institutions and national laboratories to increase significantly both the quantity and the quality of the deal flow.

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