

## **NE-19-19020, Advanced Coolant and Moderator Enclosure Solutions for Micro Gas Cooled Reactors with Enhanced Efficiency and Safety**

HolosGen, LLC with assistance from Argonne National Laboratory (ANL) will develop advanced coolant sleeve and moderator enclosure solutions for the Holos-Quad micro-gas cooled reactor (GCR) concept operating at high temperatures. Due to the similarity of the coolant sleeve and hydride moderator enclosure challenges, HolosGen thinks a uniform solution (with limited modifications for each specific application) can be developed with assistance from ANL. ANL will help develop the coolant sleeve and moderator enclosure for HolosGen and help increase the technology readiness level of the related solutions. The success of the development will be crucial for HolosGen to overcome the current challenges in increasing reactor operation temperature and improving the moderation efficiency.

As these innovative materials solutions can also be applied to other micro-reactor or gas-cooled reactor concepts with limited modifications, the accomplishments of this project are expected to facilitate the U.S. nuclear energy deployment by (1) enabling advanced coolant sleeves and moderator enclosure for a micro-GCR to operate at a higher temperature (i.e., higher efficiency for Brayton cycle) with a reduced core size and/or a longer life, which will significantly increase the economic competitiveness and facilitate transportability, (2) enabling the use of a hydride moderator for an advanced enclosure to relieve the under-moderation issue and thus enhance the micro-reactor safety during water flooding incidents, and (3) demonstrating the benefits of adopting innovative materials solutions for nuclear energy development thereby encouraging innovations in nuclear materials to advance nuclear technologies.