Gerstenhaber showed that the Hochschild cohomology of an algebra A has a $G$-algebra structure, namely a graded commutative cup product and a bracket that satisfies a graded Jacobi identity. Hochschild cohomology has a generalization called the higher order Hochschild cohomology. It is associated to a commutative algebra and to a simplicial set, and agrees with the usual Hochschild cohomology when the simplicial set is taken to be $S^1$. Following a paper of Gerstenhaber and Voronov, I will show the existence of an operad structure which induces a $G$-Algebra structure on the higher order Hochschild cohomology associated to $S^2$. 

(Received September 17, 2018)