

# 2022 IBS-CALDES Tutorial

- ✓ **Date & Time** 2:00PM, November 11 (Fri), 2022
- ✓ **Zoom ID: 831 7041 2906 / PW: 603934**

- ✓ **Speaker : Prof. Sung Wng Kim (SungKyunKwan Univ.)**
- ✓ **Title : Electrons Innovate Materials:  
Quantum Alchemy in “2D materials”, “Semiconductor” and “Metal”**

In this talk, I would like to introduce the exotic material, electriles from their history and basics to recent research, with particular focus on two-dimensional electriles.

Electrile, which is regarded as a new emergent quantum material, is ionic crystal in which electrons serve as anions. The physical properties of electriles are determined by the topology of cavities or channels which confine anionic electrons. The most representative property is a low work function based on the anionic electrons. Recently, it was demonstrated that the intralayer space of 2D layered materials can be the confining sites for anionic electrons, showing a freedom in degree of localization. This new 2-dimensional electriles have provided fundamental difference in electronic structure from the 2-dimensional electron gas systems in topology and physical properties. It will be highlighted that the diverse magnetism based on two-dimensionally confined anionic electrons can be possible in electriles even without magnetic elements. Further, the water- and acid-stable 2D electriles enabling a persistent electrocatalytic reaction such as HER and ORR will be introduced as practical applications of electriles. As perspectives, pure 2D electron phase on the 2-dimensional electrile and novel metal surface created by electriles will be introduced and discussed in the context of new “electron physics”.