

Overview of ALMA Large Project FAUST
(Fifty AU Study of the chemistry in the disk/envelope system of Solar-like protostars)

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A huge variety of planetary systems has been discovered in recent decades, and it likely related to the early history of their formation. Meanwhile, it has been recognized that protostellar cores show chemical diversity, especially in the composition of organic species. For instance, two distinct cases are well known: hot corino sources are rich in interstellar complex organic molecules (iCOMs), while warm carbon-chain chemistry (WCCC) sources are rich in unsaturated hydrocarbons. They are still unclear whether such a chemical diversity is seen in disk-forming regions (~50 au scale) and what kinds of molecular species are delivered into disks from envelope gas (~2000 au scale).

To tackle with the above problems, our ALMA large program 'FAUST' (P.I. S. Yamamoto) focuses on the early history of Solar-type protostars and their chemical diversity on a 50 au scale, where planets are expected to be formed. The main goal of this project is to reveal and quantify the variety of chemical composition of the disk/envelope system. We observed thirteen young (Class 0-I) protostellar sources as representatives of the chemical diversity observed on larger scales to obtain a homogeneous database of thousands of images from different lines and species. The analysis of this huge database is in progress (1) to disentangle the components of the 50-2000 au disk/envelope system, (2) to characterize the organic complexity in each source, (3) to probe their ionization structure, and (4) to measure their molecular deuteration. We are going to present the overview compiling the results in 13 sources.