**Motivation**

The main source of energy in most developing nations is traditional biomass, which is in form of firewood, cattle manure and straw etc. The use of firewood as cooking fuel has several negative effects, both environmental and social. One way to solve this problem is the use of biogas. More than forty million household low-cost anaerobic digesters have been built across Asia and the total world technical potential has been put at 155 million. Household anaerobic digesters could contribute largely to the mitigation of greenhouse gases and provide a sustainable energy source for cooking and electricity production especially in rural areas in developing countries. Moreover resources like, N, P, and K are preserved for reuse in agriculture. The potential of domestic household digesters is however still far from being achieved.

Almost all domestic biogas plants (DBPs) are “unstirred” i.e., not provided with mechanical mixing device. The Chinese dome digester, the most popular is mixed by gas pressure build up when the biogas is not used resulting to liquid displacement in the effluent chamber. During gas use the pressure drops and liquid content in the effluent chamber flows back in to the reactor. Mixing is however an important parameter in the anaerobic digestion process. Because of the poor mixing in domestic anaerobic digesters, excessive substrate dilution is usually done leading to long hydraulic retention time (HRT) and ultimately big reactor size and high cost.

Till date, little is known on the extent of mixing in the Chinese dome digester in relation to input concentration, HRT and gas use and how it affects digestion efficiency. There is need to study mixing for optimization and subsequent reduction of HRT.

**Technological challenge**

The technological challenge is to decrease the reactor size by increasing the mixing conditions at an increased input condition and reduced HRT.