# The device for in-situ study of crystallization of polymer induced by multidimensional flow with synchrotron radiation techniques

**JiaRui Chang**

National Synchrotron Radiation Lab (NSRL) & School of Nuclear Science and Technology
University of Science and Technology of China (USTC), Hefei, China

## Introduction

As we all know, polymer tube has a very wide application in our daily life. While, a single flow field can only result in axial orientation of molecular chain. On account of that dimensional flow field can make the molecular chains of both axial and circumferential orientation, we decided to invent a device that can produce dimensional flow field. And on the other hand, inspired by the research of the effect of chiral helical flow field on supermolecular helical enantiomers, we are very interested in whether multidimensional flow field can regulate the helical conformation of synthetic polymer or not. There are two common synthetic polymers with helical conformation in our daily life, iPP and iPB-1. If we can control the helical conformation of synthetic polymer , polymer materials will get more extensive application. Hence, we have developed a apparatus, and it will be combined with synchrotron radiation techniques, using in in-situ study of crystallization of polymer.

## Overall view

•Brief introduction

We have two electric motors in our device, one for rotating, and the other for elevating. Through starting the two electric motors in the same time, we can build a dimensional flow field in the gap between axle and sample chamber.

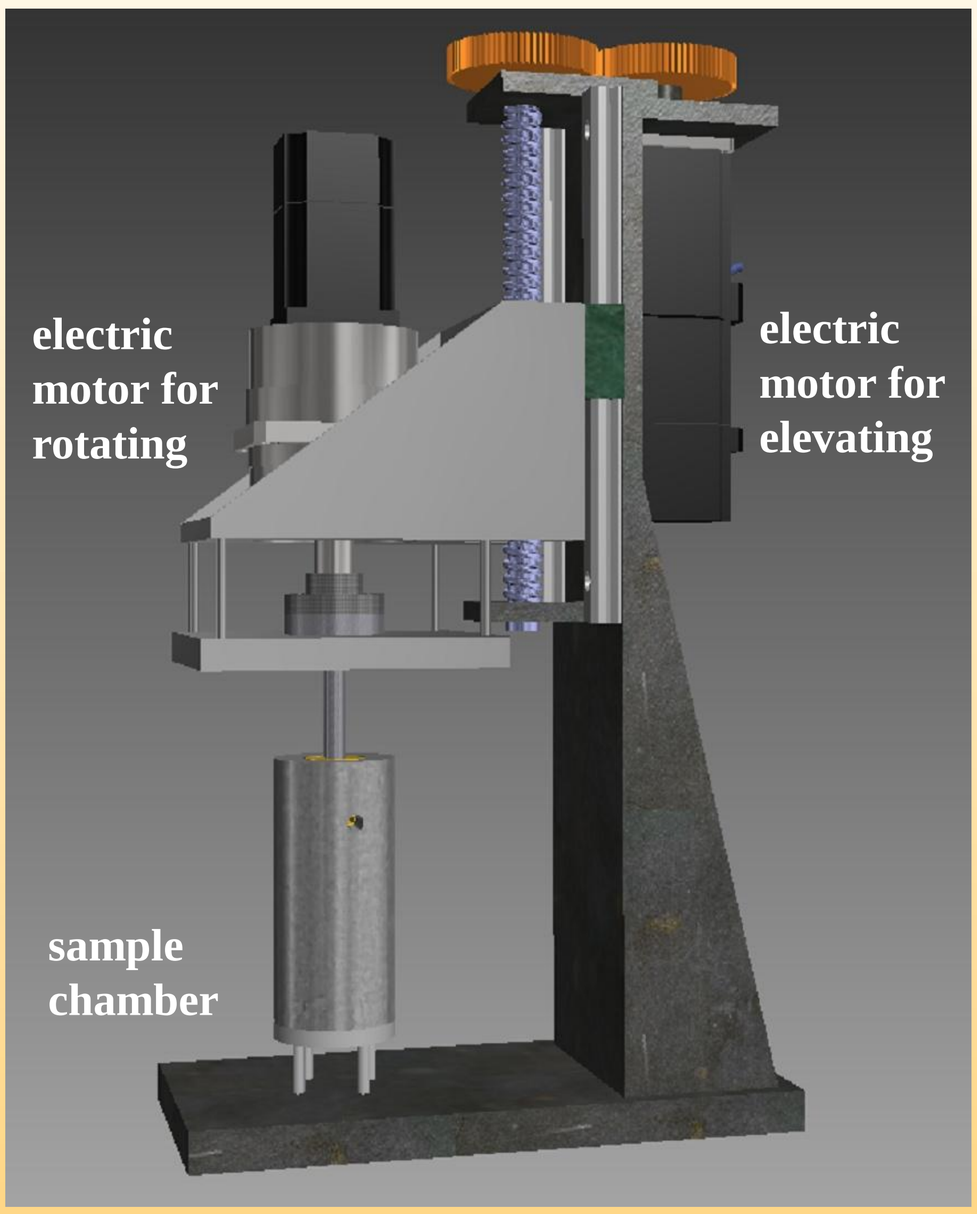


Figure1. The 3-dimentional stereogram of dimensional flow field device

## Details of the device

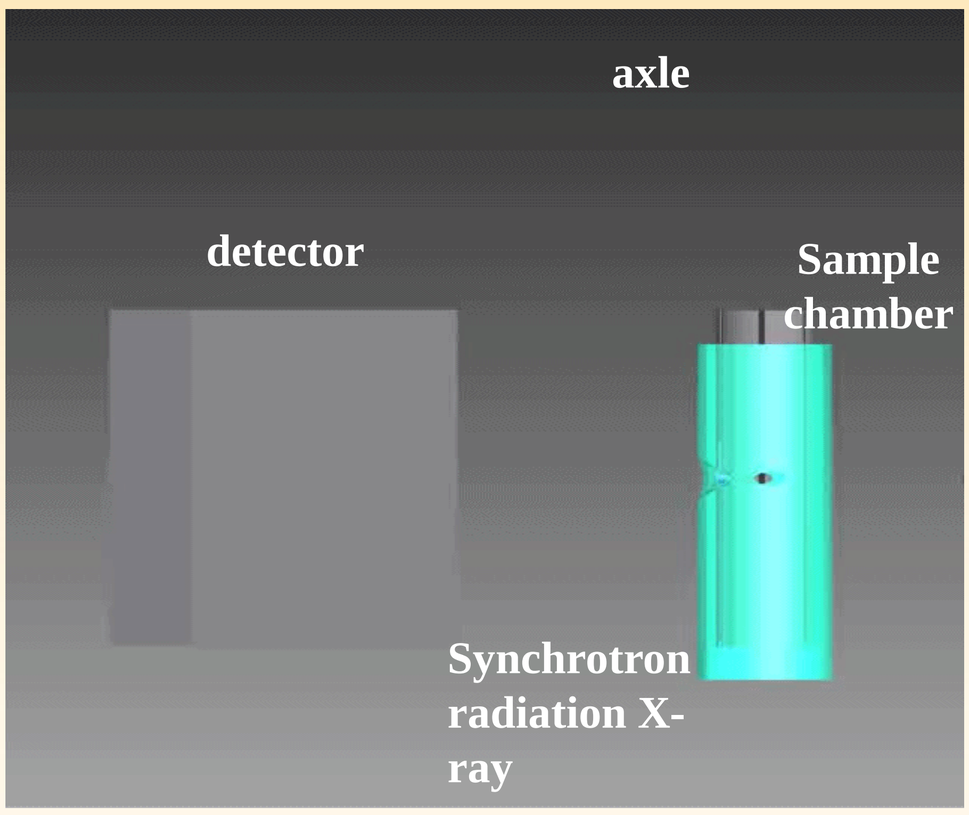


Figure2. The schematic diagram of dimensional flow field device

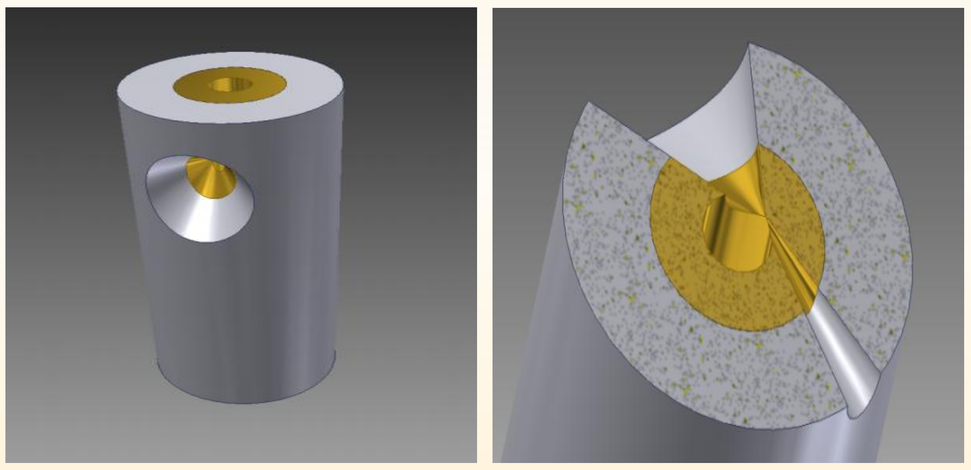

Figure3. The diagram of sample chamber and optical aperture

•The working principle

In the wall of sample chamber, the optical aperture is open. The outside is a heating jacket, and it will be used to produce polymer melt. When we put this device into use, polymer thin film with suitable thickness will be filled in the gap between axle and sample chamber. And we will set up a dimensional flow field in the gap as soon as the two electric motors are started. Then, we can combine our device with synchrotron radiation X-ray to in-situ study the crystallization of polymer induced by multidimensional flow.

## highlights

•Combine device with synchrotron radiation techniques.
•Pioneer the research of crystallization of polymer induced by multidimensional flow.
•The parameters of multidimensional flow built by our device are adjustable.
•Focusing on regulation of synthetic polymer helical conformation for the first time.

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