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| Report for International Internship |  |
| Student Name: | Manish Kumar Das |
| Program Name: |  |
| University: | Ecole Polytechnique Federale de Lausanne |
| Department: | Mechanical Engineering |
| Project Topic: | Coffee Stain effect on Soft substrates |
| IITKGP Dept./School/Center and Degree Program: | B. Tech Degree Program in Chemical Engineering |
| Duration of Internship: | 10 weeks (3rd May,2019 – 13th July, 2019) |
| Supervisor Name: | Prof. John Kolinski |

**PROJECT DETAILS, OUTCOMES AND SUMMARY (3-4 BULLET POINTS OF WHAT YOU LEARNED AND HOW IT IS GOING TO APPLY TO REAL LIFE):**

* Worked on project titled “Study of coffee stain effect on soft viscoelastic substrates “.
* The main objective was to study the effect of different parameters like concentration, substrate elasticity and drop volume on the coffee stain effect and find novel combinations in an attempt to suppress it.
* The major outcome of my work was the discovery of a novel phenomenon which was a consequence of very high elastic modulus of the substrate causing a depression like geometry, inducing a suppression of the ring formation to a large extent.
* The daily basis of my lab routine involved doing these drop experiments varying different parameters, observing final morphology on an optical microscope, doing z-axis interferometry and recreating the 3D morphology using a self-written MATLAB code.
* Learned both software and experimental skills along the way. Had the opportunity to go a bit deeper into the interesting physics of soft matter, learn about the applications of particle physics at previously unexplored length scales.
* The suppression of coffee ring effect is a widely researched topic, as it is highly desirable and has wide applications from ink-based printing to chip design and microscale patterning. In most applications, you would want a uniform deposition of particles throughout the droplet region and this suppression based on elasticity plays a major role.

**OTHER ACTIVITES:**

* Attended conferences and poster sessions, occasional lunch parties with the group
* Enjoyed hikes to the nearby swiss mountains and the traditional swiss cheese fondue
* Short day trips to nearby European cities and exploring their rich culture