

## Annual Highlights

The research activities at IDUN in 2016 have resulted in 15 peer reviewed journal articles and 33 conference contributions (oral and poster presentations), including 9 invited talks and 2 patent applications. 49 people were in 2016 working in relation to the IDUN center (see personnel list). In terms of teaching we have in 2016 successfully extended our PhD summer school program with a track on drug delivery (in addition to the PhD summer school on micro and nano sensors running on its fifth year). The two summer schools were run in parallel with several joined lectures and social program to facilitate interdisciplinary collaboration.



**Figure 1:** The IDUN mission statement (the result of a series of workshops on communication strategy held in 2016).

During 2016 a series of IDUN workshops were held, all focusing on (internal and external) communication. This has resulted in the formulation of an IDUN mission statement (Figure 1, right) and the 5 IDUN values: Openness, Inclusiveness, Having ambitions, Making a difference and Collaboration. Furthermore, the workshops have resulted in a range of initiatives to enhance and develop the external as well as internal communication at IDUN, e.g. redesign of the IDUN webpage, the introduction of new platforms for internal communication, workshop on how to handle conflicts and the launch of the IDUN Facebook page.

### **IDUN Sensor**

In IDUN Sensor we explore nanomechanical sensors and combine these into strong and generic research tools and systems, for example for fundamental studies of molecular actions, cell behavior and structural properties. Several new sensors and sensor systems have been realized and tested in 2016. This includes; carbon-based resonators, hollow strings, transparent SERS substrates, resonating filters and SERS-based detection integrated on rotating discs. Some of these have already been applied within the IDUN Drug research field. For example photothermal nanomechanical spectroscopy on resonating nano-filters has been used to characterize crystallinity of pg of drug samples. Nanograss chips for SERS detection have been used for sample separation (much like in an HPLC column) and used for detection of several small molecules in urine and milk.

### **IDUN Drug**

In IDUN Drug we design, realize and characterize micrometer sized containers for oral administration of drug. We have in the past year developed new methods for loading the containers with drugs (powder and impregnation of polymers) and have solved a technical challenge related to how to deposit lids on the filled containers and how to subsequently release them from a carrier substrate in a simple manner. A second round of animal studies has been performed (with the test drug ketoprofene) and currently vaccine studies in mice are performed. New methods for testing mucus adhesion are being established and our nano-textured surfaces are indeed increasing mucus adhesion. A 3D printing facility has been established and microcontainers are now produced in various geometries using 3D printing.