ASSEMIC
Advanced Methods and Tools for Handling & Assembly in Microtechnology

ASSEMIC ANNUAL REPORT 2007- Science (I)

Edited by Ana Almansa, ASSEMIC Science Manager

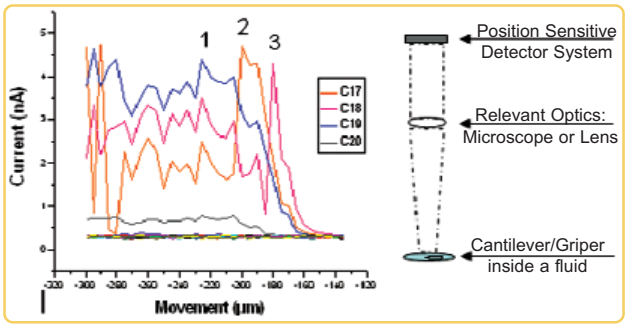
MARIE CURIE ACTIONS

ASSEMIC "Advanced Methods and Tools for Handling and Assembly in Microtechnology" (MRTN-504826, 2003-2007) is a Marie Curie Research Training Network devoted to training and research in handling and assembly in the microdimension, involving advanced methods and tools and providing a multidisciplinary, complementary approach.

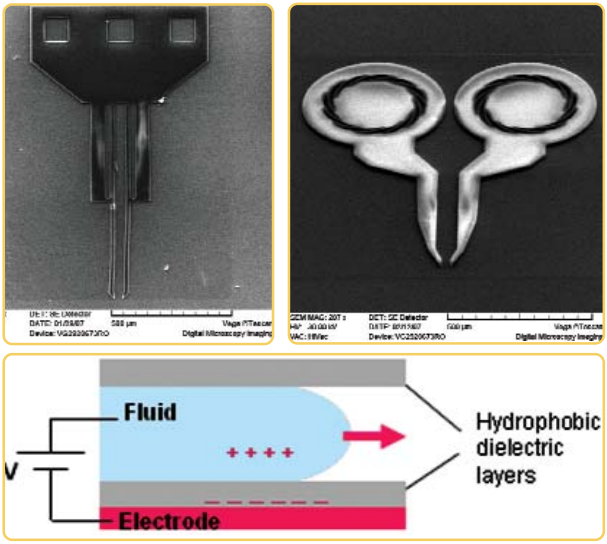
Consortium: 14 partners from 10 countries: **TU Vienna / ISAS, Austria; SSSA, Italy; FORTH IESL, Greece ; PROFACTOR Research and Solutions GmbH; IMT-Bucharest, Romania; PW WUT, Poland; Nascatec, Uni-OL, FhG/ILT, Germany; CCLRC-RAL, United Kingdom; Progenika, ROBOTIKA Spain; UNINOVA, Portugal; FSRM, Switzerland.**

Work within **Workpackage II-** Microhandling focused on finalization of the task in progress, with special focus on Task II.5 haptic human interfaces and Task III.6 operation in special environment and conditions. With regard to the last task, special mention deserves the successful experimental results of Uninova reported by ESR **Javier Contreras**, *in cooperation with Nascatec*. They used Uninova's position sensors and Nascatec's setup with the portable PSD-XDAS system in order to detect the movement of micro-cantilevers under a fluid.

Additional remarkable results were achieved by **IMT-Bucharest** on computational fluid dynamics, modelling and simulation for fluid micro-handling, performing mathematical model of a micropump actuated using the electrocapillarity effect and computer simulations of the device using the software programme Coventor 2006 **(Irina Codreanu).** In addition, *IMT also simulated and partially manufactured* (by means of SU-8) two types of grippers, applicable for micromanipulation of micro-objects including cells in liquids, medical and assembly applications **(Rodica Voicu)**.



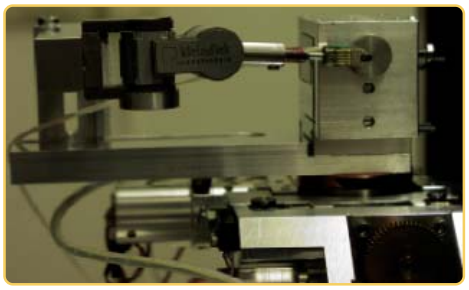
Measurement of the movement of microcantilevers under a fluid with Uninova's PSD-XDAs system



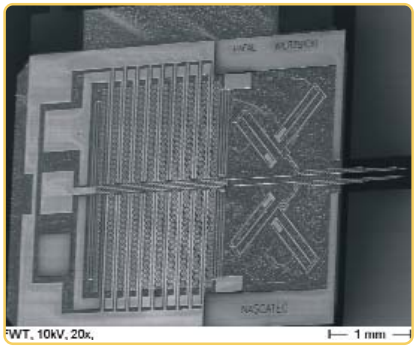
Micropump and microgrippers developed at IMT

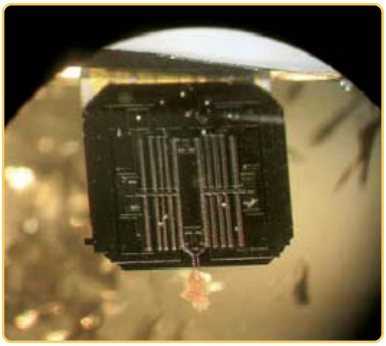
Concerning Task II.5 Human Hap tic Interfaces, SSSA developed haptic tweezers for grasping of micro-objects with fore feedback (used with sensorized tools). A teleoperation system based on LabView for micro-manipulation was also implemented by ESR Keith Houston, as well as the electronics for system control -and overall integration of the station set-up. A key contribution to this task was delivered by Oldenburg ESR, who built and implemented a software haptic interface allowing the coupling of an available haptic device, a SensAble Desktop PHANTOM [2], in the already existing control loop structure of AMiR's lab setup, in order to allow manual force feedback-enabled teleoperated control of micro- and nanomanipulators in complex tasks in two specific areas of research: carbon nanotubes (CNTs) and biological specimens.

Additional activities where reported by **Javier Contreras (Uninovas ESR)** and **Samuel Serra (RAL ESR)**:use of dynamic optical sensors for detection of microgrippers and system integration of Uninova's a 128 position sensitive detector. ESR Rafal Wierzbicki - Nascatec developed silicon electrostatically actuated microgripper, which has been designed and prototyped, and tested in a variety of applications, in cooperation with Robotiker. Work reported includes development of low-voltage silicon microgripper and blood-vessel microgripper, piezoresistive cantilever resonance frequency calibration system, capacitive position and force feedback, among others.



System architecture of the haptic interface software and its application for manipulation of nanotubes





Nascatec low voltage microgripper and blood vessel manipulation device

The publication of this page is supported by the ***MINOS-EURONET*** project (EC Contract No 015704)