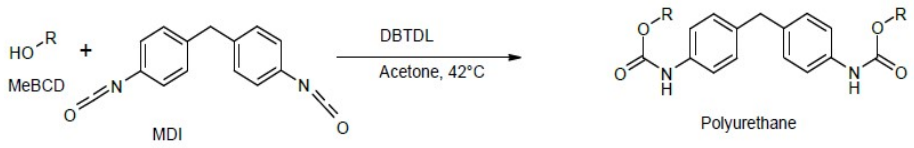
Technology	Development of novel highly cross-linked polymers allowing the specific recovery of high value added phenolic compounds from olive mill wastewater.
Research organization Fachhochschule Nordwestschweiz INOFEA Recognition Nanomaterials SIMA tec	**FHNW** The School of Life Sciences (HLS) of the University of Applied Sciences Northwestern Switzerland (FHNW) is located in the centre of the trinational Basel area (Switzerland – France – Germany). The 4 institutes of the HLS are Pharma Technology, Medical and Analytical Technologies, Chemistry and Bioanalytics (ICB) and Ecopreneurship (IEC). **INOFEA** is a spin-off from the University of Applied Sciences Northwestern Switzerland - School of Life Sciences– registered since March 2011 in the Canton Basel City, Switzerland. INOFEA has been selected to enter the CTI85 (Swiss Federal Commission for Technology and Innovation) start-up scheme. This enables the company to officially take part in CTI funded development projects and to access R&D funding. **SIMA-tec** is specialized in design and manufacturing laboratory and pilot equipment for research and development based on customers' requirements. Innovative aspects and main advantages of the equipment are the high degree of automation and a highly precise recording of measured data.
Description of the technology being developed	A synthetic nanostructured polymer was developed using cyclodextrin-based polyurethanes (CDP) for the recovery of specific phenolic compounds from olive mill wastewater. Cyclodextrins are cyclic oligomeric macrocycles of glucose bound via α- (1,4) glycosidic bonds capable of complexing compounds inside of its cavity. The reaction to produce the CDP consists of the polymerization of methylated β-Cyclodextrin (Me-β-CD) with 4,4'-methylene diphenyl diisocyanate (MDI) in acetone with dibutyltin dilaurate (DBTDL) as catalyst.  The polymer is designed by FHNW and produced by INOFEA and has been tested by FHNW on the lab-scale reactor produced by SIMA-Tec. Lab scale reactor developed by SIMA-Tec consists of an automated pilot plant equipped with a fixed bed reactor with the following attributes: • Two fixed bed reactors in serial line, but separately usable • Regeneration of the polymers with two different eluents, but separately usable and storable in two reclaim tanks • Possibility of rinsing of the fixed bed reactors (say, with water) to avoid blockages • Automated loading, regeneration and rinsing • Automated sampling

	A complete protocol has been developed and allowed the specific recovery of tyrosol compound with 61% purity. 71% purity was achieved for tyrosol & hydroxytyrosol together.
Benefits	• The method allows the reduction of chemical oxygen demand (COD) level in the olive mill wastewater by 15 times making them relevant for crop irrigation • Polyphenols have wide industrial applicability in the tannery, cosmetic and pharmaceutical fields, because of their numerous properties (chelating, antiaging, antioxidant, anti-carcinogenic, antibacterial, reduction of cardiovascular risk).
Financial viability	The production of the CDP is based on inexpensive molecules with a straight forward and a simple polymerization process. Potential financial benefits from improved treatment of effluent and recovery of valuable polyphenols have to be balanced against increased cost of this novel treatment.
Potential users	Olive mills, food industry, cosmetic industries, tanneries, pharmaceutical industries
Contact person	Prof. Dr. Shahgaldian (FHNW) Head of Supramolecular Chemistry at Institute for Chemistry and Bioanalytics FHNW, Switzerland Tel: +41 61 467 43 46 Email: patrick.shahgaldian@fhnw.ch Y. Dudal (INOFEA) Managing Director, INOFEA Tel: +41 (0)76 423 1229 Email: Yves.dudal@inofea.com Mark Enders (SIMA-TECH) General Manager, SIMA-TECH Tel: +49 2233 946310 Email: mark.enders@sima-tec.de