Early Stage Researcher position as a PhD scholarship available at the Department of Chemistry, University of Milan (ITALY), in the framework of the EU-funded Marie Skłodowska-Curie ITN-ETN training network "NANOCARB: Glyco-Nanoparticles for Applications in Advanced Nanomedicine ".

The NanoCarb network
The NanoCarb network is a multidisciplinary consortium including universities, research centres and SMEs with broad expertise ranging from nanotechnology, carbohydrate chemistry, glycoprofiling and in vitro/in vivo screening specialists. The network will develop novel and well-characterised nanomaterials with synthetic and native glycans that will be used for therapeutics and guide development of new drug delivery applications. The project will train Early-Stage Researchers (ESR) at the interface of nanotechnology and glycosciences, with the overall goal of achieving a new generation of professionals in nanomedicine for a prospective career in both academia and industry. The successful candidates will benefit from an international scientific network of high-profile academic and industry partners offering state-of-the-art research facilities in nanotechnology, carbohydrate chemistry, and biological screening as well as career relevant training.

The research activities within NanoCarb will be implemented in 3 scientific Work Packages: 1) Nanomaterial and glycan synthesis and functionalization; 2) Nanomaterial BioNano Interfaces and nanosafety; 3) Nanomaterial testing in vitro and in vivo.

For more information on NanoCarb network please visit: www.nanocarb.eu.

Research group and general conditions
The PhD student will be placed at the Department of Chemistry, University of Milan, in the laboratory of Prof. Luigi Lay (http://users.unimi.it/fuigilaygroup), and under his supervision. The recruited PhD student will be enrolled in the PhD programme in "Chemistry", and will be covered under the social security scheme. He or she will receive a Monthly Living Allowance plus a Mobility Allowance compliant with the applicable EC Marie Skłodowska-Curie Actions-ITN general conditions.

The recruited PhD student will participate in the network's training activities and work placements at the laboratories of the participating academic and industrial partners. In addition, the training programme of the recruited ESR will be supplemented by regular meetings and workshops within the NanoCarb International Training Network.

The research project

ESR4: Synthesis of smart glycosides to enhance the glyco-nanomaterial circulation half-life.
It is well established that a poor blood circulation lifetime of nanomaterial is a major limitation to the clinical applications of nanomedicines. In this regard, the present project is focused on the design and synthesis of well-defined "smart" glycosides to be employed for the surface functionalization of the nanomaterial, with the aim to improve its biocompatibility, solubility, and even the circulation half-life. In particular, the major task of the selected ESR will be the synthesis of mono- and oligosaccharides endowed with active-targeting properties (i.e., possessing the ability to target the carbohydrate-binding domain of specific cellular receptors) and bearing an anomeric linker suitable for nanomaterial functionalization. Various kinds of linkers (also provided by other NanoCarb
beneficiaries), differing for their chain length and lipophilicity, will be synthesized and evaluated, and eventually correlated with the active targeting properties of the corresponding glyco-nanomaterial.

Specifically, the selected ESR will be engaged in 1) Synthesis of mono- and oligosaccharides possessing active-targeting properties bearing an anomic linker suitable for nanomaterial functionalization; 2) Design and synthesis of a set of PEG-based linkers, differing for their chain length, to be glycosylated with the target glycans; 3) Sequential introduction of negatively charged moieties on the synthetic glycosides to modulate the nanomaterial surface charge.

The research project is highly multidisciplinary and the selected fellow will develop knowledge in synthesis and structural characterization of carbohydrates and oligosaccharides, bio-immunology, surface chemistry and nanomedicine.

Planned secondments are in 1) MIDATECH LTD (UK, Industry, to be trained in the synthesis and characterisation of LPS free gold nanoparticles under GMP conditions; 2) RCSI (Ireland, University), to be trained in the characterization of the Glyco-NP in complex media and protein corona studies.

**Starting date of the PhD programme:** February 1st 2019.

**Admission criteria for doctoral education at the University of Milan**

In order to apply for a place in the PhD programme, students must have a second-level degree, an equivalent qualification, or an equivalent qualification by study level (Master's Degree) from a foreign University. In addition, English language skills at B2 level (minimum) is required to cover the position. The suitability of the foreign academic qualifications in terms of content is appraised by the Examining Board constituted for admission to each PhD programme, in compliance with the regulations in force in Italy and in the country in which the academic qualification was issued, and the international treaties or agreements pertaining to the conferment of qualifications for the continuation of studies.

**Other project specific requirements**
- Master degree in Chemistry or equivalent
- A suitable background for the open position includes synthesis and structural characterization of carbohydrates and oligosaccharides;
- A basic background in biochemistry will be also appreciated;
- Experience in performing laboratory work independently;
- Good collaborative and social skills and an open-minded mind-set;
- Good proficiency in written and spoken English (minimum B2 level).

**Mobility eligibility requirement**

The fellow must not have resided in the country where the research training activities will take place for more than 12 months in the 3 years immediately prior to the recruitment date (and not have carried out their main activity (work, studies, etc.) in that country).

**Experience eligibility requirement**

Eligible applicants must have less than 4 years research experience (Early Stage Researcher) at the signature of the contract (measured from the time the Master's degree has been obtained). Eligible applicants must not have a PhD yet.

**Application procedure**

The applicant must send the following documents (if possible included in a single zipped file attachment) to Prof. Luigi Lay (luigi.lay@unimi.it) within 26 November 2018, clearly indicating in the subject "Application for ESR4 position":
1) Up-to-date Curriculum vitae inclusive of contact details of previous supervisors (max. 3 pages);
2) a letter giving reason for his/her motivation for the post (max. 1 page);
3) Names and contact details of three referees (this may include previous supervisors);
4) the scan of the degree (usually the Master Degree) which would formally entitle him/her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher will be recruited. In case the degree has not been obtained yet, it is
necessary to send a declaration of the university stating that the degree will be obtained before the expected starting date (see below);  
5) a document indicating his/her ranking and marks within his/her last year at his/her Master Degree as well as the courses/modules they have attended (optional). This document is mandatory for applicants who do not have yet obtained the degree.  
6) a summary of the Master Degree thesis or a brief description of the past scientific activity (this can also be included in the CV).  
**IMPORTANT NOTE:** The applicants must assure their availability to start the PhD programme not later than **February 1st 2019.**  

**Assessment criteria**
Applications must be in English and will be evaluated against the following criteria:  
- Educational record;  
- scientific quality of the applicant’s CV;  
- expected individual impact and benefit to the fellow and to the project.  
- previous experience in the subject of NanoCarb research programme.  

All applications will be handled confidential. By submitting an application, applicants consent to their application being shared with the other principle investigators of the NanoCarb consortium for the sole purpose of the candidate recruitment. Only short-listed applications will be acknowledged.