

**AHRC Collaborative Doctoral Partnership
Research Studentship 2017**

The National Gallery, Scientific Department & Nottingham Trent University, School of Science & Technology

Conservation varnishes at the National Gallery: studying their optical and material properties

Applications are invited for a Collaborative Doctoral Partnership PhD studentship, to be undertaken at Nottingham Trent University (School of Science & Technology) and the National Gallery (Scientific Department). This studentship will be jointly supervised by Professor Haida Liang at Nottingham Trent University and Dr Catherine Higgitt at the National Gallery. The studentship is for a three-year (full-time) project entitled 'Conservation varnishes at the National Gallery: studying their optical and material properties', to commence on 1 October 2017. The student may also apply to the Student Development Fund (see below) to allow a (remunerated) placement of up to 6 months duration at the National Gallery during the PhD to further develop and expand their skills. The student will need to spend concentrated periods of time both at Nottingham Trent University and at the National Gallery. This is an interdisciplinary project involving close collaboration between physicists, conservation scientists and conservators.

Summary of Project:

Historically and today, conservation varnishes based on natural or synthetic resins are applied to most Old Master paintings after cleaning and restoration. Such varnishes alter a painting's appearance, saturating the surface and reducing variation in gloss, and provide a protective coating. However, the optical, chemical and physical properties of such varnishes can alter with time, leading to changes in the behaviour of the varnish and the appearance of the painting. Currently, our understanding of such changes is largely based on experimental studies (often involving accelerated ageing experiments) or on the expected properties of the bulk resin or polymer, which do not always accurately reflect the long term behaviour of thin films of conservation varnishes. Furthermore, it has become apparent that in practical usage, conservators often have to make adjustments to varnish formulations (e.g. choice of resin, solvents or additives or the combined use of resins as layered systems or blends) in order to obtain a satisfactory appearance of the varnished painting.

This project will investigate the actual properties of conservation varnishes, in order to be able to predict more accurately how conservation varnishes behave in practical usage and how their properties might be improved or modified for particular applications, based on the use of cutting-edge non-invasive optical imaging and spectroscopic techniques including optical coherence tomography (OCT) to allow a (non-subjective) assessment of the appearance, condition and properties of both existing varnishes and experimental systems. OCT produces 3D images ('virtual cross-sections) of surface and subsurface microstructure of transparent and semi-transparent materials and has shown promise for research on varnishes on paintings. OCT and other non-invasive portable equipment, as well as chemical analysis with more traditional laboratory equipment, will be used to investigate the effect of not only of the choice of resin but also the practical issues of formulation and application method on the properties (including surface roughness, scattering, layer thickness, transparency, yellowing, elasticity, refractive index and glass transition temperature) of the resulting conservation varnish. The research will draw on both the unique resource of the actual, naturally aged conservator-applied varnishes on the Gallery's paintings and experimental systems in which formulations and application method can be explored by studying film formation processes and the optical and physical properties of the resulting film. The research outcomes have the potential to feed directly into conservation practice at the National Gallery and around the world.

Funding:

This Collaborative Doctoral Partnership PhD studentship is funded by the AHRC. The full studentship award for students with UK residency* includes fees and a stipend of £14,553 per annum plus £550 p.a. additional stipend payment for Collaborative Doctoral students for 3 years. In addition, the Student Development Fund (equivalent to 0.5 years of stipend payments) is also available to support the cost of training, work placements, and other development opportunities. Students with EU residency are eligible for a fees-only studentship award. International applicants are normally not eligible to apply for this studentship. The National Gallery will provide up to £1000 a year to cover travel and other costs the student incurs travelling to carry out research at the Gallery and other locations. Both partners and the CDP consortium will provide opportunities for training and career development.

*UK residency means having settled status in the UK that is no restriction on how long you can stay in the UK; and having been "ordinarily resident" in the UK for 3 years prior to the start of the studentship that is you must have been normally residing in the UK apart from temporary or occasional absences; and not been residing in the UK wholly or mainly for the purposes of full-time education.

Eligibility:

Applicants must have a good first degree (usually a minimum 2:1) or a Masters degree (or other equivalent experience) in physics, chemistry, materials science, conservation science, heritage science, archaeological science, or a related physical science discipline, or conservation (in which case a first degree in a physical science subject would be desirable). They should be highly motivated individuals with a keen interest in art history and conservation of paintings, and in conducting interdisciplinary research. The project would suit a candidate interested in a career in conservation science or a scientist with an interest in applying cutting-edge scientific techniques and complex data processing methods to challenging questions such as those posed by cultural heritage artefacts. Students must also meet the eligibility requirements of the UK Research Council for graduate students. The minimum English language proficiency requirement for candidates who have not undertaken a higher degree at a UK HE institution is IELTS 6.5 (with a minimum of 6.0 in all skills).

The closing date for applications is **12:00 noon (UK time) on 13th March 2017.**

Further Information and application:

For informal enquiries, please contact the main supervisors Professor Haida Liang (haida.liang@ntu.ac.uk) or Dr Catherine Higgitt (catherine.higgitt@ng-london.org.uk). Application is by covering letter, CV and online application form, and should be sent to doctoralschool@ntu.ac.uk and copied to haida.liang@ntu.ac.uk.

Application packs can be obtained from

http://www4.ntu.ac.uk/research/ntu_doctoral_school/studentships/index.html