RELAZIONE ATTIVITA’ ANNUALE DEI PERFEZIONANDI/DOTTORANDI – SECONDO ANNO

REPORT ON THE PHD ACTIVITY – SECOND YEAR

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| **NOME E COGNOME**  **NAME AND SURNAME** | Ayush Tyagi |
| **DISCIPLINA**  **PHD COURSE** | Nanoscience |

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| **CORSI FREQUENTATI CON SOSTENIMENTO DI ESAME FINALE**  **ATTENDED COURSES (WITH FINAL EXAM)** | **VOTAZIONE RIPORTATA**  **MARK** | **NUMERO DI ORE**  **HOURS** |
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| **CORSI FREQUENTATI SENZA SOSTENIMENTO DI ESAME FINALE**  **ATTENDED COURSES (ATTENDANCE ONLY)** | **NUMERO DI ORE**  **HOURS** |
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| **ALTRE ATTIVITÀ FORMATIVE (SEMINARI, WORKSHOP, SCUOLE ESTIVE, ECC.) – DESCRIZIONE**  **OTHER PHD ORIENTED ACTIVITIES (SEMINARS, WORKSHOPS, SUMMER SCHOOLS, ETC) – DESCRIPTION** | **NUMERO DI ORE**  **HOURS** |
| Schools on the frontiers of light: Symposium on “Emergent phenomena in Moire materials”, organized by ICFO and MIT from July 6th to 17th 2020. | 24 |
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| **ATTIVITÀ DI RICERCA SVOLTA (MAX. 8.000 CARATTERI)\***  **RESEARCH ACTIVITY (MAX. 8000 CHARACTERS)** |
| **Effect of different polymers on the properties of CVD graphene.**  **Abstract (Project-1)**  Graphene is a 2D material which has shown its potential in numerous fundamental applications. Contamination of graphene due to transfer and nanofabrication process is very common.We present a new way to enhance morphological and electrical properties of CVD graphene by adopting a two step cleaninig procedure using acetone and remover (1,3-dioxolane, 1-methoxy 2- propanol). It is found that remover eliminates the PMMA (polymethyl methacrylate) resiues rapidly which are attached to the graphene surface with typical acetone treatment without introducing any additional defects. The samples were characterized by Raman spectroscopy and atomic force microscopy (AFM), which clearly provides the comprehensive understanding of the PMMA removal from graphene surface by remover which creates morphological changes and direct impact in the doping of graphene layer.Moreover, the graphene field effect transistors (FET) were fabricated as well by using electron beam lithography (EBL) to demonstrate high carrier mobility at room temperature.  **Abstract (Project-2)**  Rubbers, having unmatchable viscoelastic properties, are important materials with immense applications in industries such as tires. Conventionally, rubbers are too fragile to fulfill the requirements for many applications such as insufficiency of hardness, wear resistance and strength properties. But by using particular filler materials the strength could be increased several times. Graphene has attracted enormous attention in the field of rubber composites for its excellent potential for improving overall rubber performance. Most of the research is dedicated at the bulk scale in this field. We are investigating the effect of rubber/graphene at nanoscale which can open a better way to understand the effect of graphene as a filler material in tires. Here, we have basically deposited a thin film of rubbers such as polybutadiene and styrene butadiene on the CVD graphene. The changes in the properties of graphene are recorded by using Raman spectroscopy, AFM and electrical measurement done by using four probe setup at room temperature. In future, we are going to study the combined effect of rubbers/graphene/pyrrrole adducts aspyrrole beleived to be a promising agent to improve the physicochemical properties of carbon allotropes such as graphene, carbon nanotube and carbon black. |

\*se si intende sottoporre una relazione di ricerca più estesa, utilizzare il campo per una descrizione sintetica e allegare il documento in formato .pdf

If you are going to submit a longer report, please fill the box with a synthetic abstract and attach a document in pdf format

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| **EVENTUALI PUBBLICAZIONI**  **PUBLICATIONS (IF AVAILABLE)** |
| Tyagi et al, “Towards high quality CVD graphene for relevent technological applications.” in preparation. |
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| **NOME DEL RELATORE**  **THESIS ADVISOR** |
| Dr. Camilla Coletti |

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| **DATA**  **DATE** | 16/10/2020 | **FIRMA**  **SIGNATURE** |  |