

Preparation of Graphene-Based Dispersions for E-textiles

Onur Demirel^{1,2}

Merve Yaşacan¹, Mehmet Işık¹, Sena Caylak³, Amir Navidfar⁴, Levent Trabzon^{3,5}

¹ASELSAN Inc., 34906, Teknopark Istanbul, Istanbul, Turkey

²Sabancı University, 34956, Orta Mahalle, Tuzla, İstanbul, Turkey

³Istanbul Technical University, 34437, MEMS Research Center, Maslak, Istanbul, Turkey

⁴Bahcesehir University, 34439, Mechatronics Engineering, Beşiktaş, Istanbul, Turkey

⁵Istanbul Technical University, 34437, Faculty of Mechanical Engineering, Gümüşsuyu Campus, Beyoğlu, Istanbul, Turkey

myasacan@aselsan.com.tr

Graphene-based smart textiles have taken a great attention due to their broad range of applications over conventional metal systems. In recent years, researchers have attempted to explore the potential applications of graphene in the field of functional electronic textiles, such as chemical, biochemical, physical sensing, communication and heating applications [1-5]. For such fields, graphene-based highly conductive dispersions could be a part of the solution. In this study, we focused on preparation of graphene-based dispersions to achieve wearable conductive e-textiles. Concentration of active material, surfactant, binder and surface area of graphene nano platelets (GNP), solution temperature, iteration cycles, drying time and temperature parameters are optimized in order to examine electrical/thermal conductivity, stability and scalability properties of the fabrics. In addition, X-ray Photoelectron Spectroscopy (XPS), Scanning Electron Microscopy (SEM), Raman and FT-IR Spectroscopy, Particle Size (PS) analyses are examined to develop the dispersions.

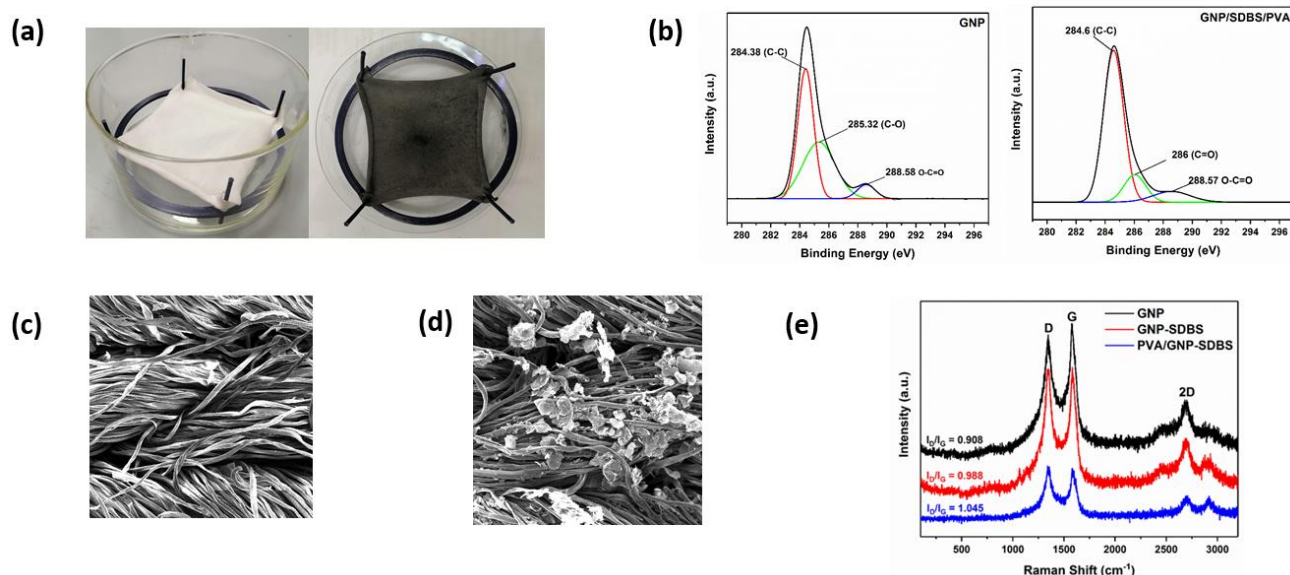


Figure 1: (a) 100% cotton bare fabric (left), graphene dispersion treated fabric, (b) High resolution XPS spectra of GNP and GNP+surfactant+binder, (c) SEM data of bare fabric (d) SEM data of graphene dispersion treated fabric with 25 μm PS (e) Raman spectrum of dispersion formulations with GNP, surfactant and binder.

Finally, electrical resistance measurements of the fabrics treated with optimized dispersions are compared.

References

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