DNA aptamer conjugated magnetic graphene oxide as a multifunctional nanoplatform for molecular recognition and photothermally destruction of methicillin-resistant staphylococcus aureus cells

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A multifunctional nanoplatform was developed for detection and photothermally destruction of methicillin-resistant staphylococcus aureus (MRSA) bacteria. First of all, the iron oxide (Fe_3O_4) nanoparticles (NPs) were grown on the surface of the graphene oxide (GO) and magnetic GO (mGO) were functionalized the MRSA DNA aptamers labeled with amin ($-NH_2$) group on one end that were specifically synthesized for MRSA. The MRSA were rapidly, sensitively and accurately captured with aptamer functionalized mGO (Apt@mGO) and it was photothermally destroyed under the near infrared laser (NIR, 808 nm). While aptamer specifically binds to MRSA, MRSA will be magnetically separated with a magnet without centrifugation due to magnetic property of mGO. While GO was used as a platform for aptamer and Fe_3O_4 NPs, it was utilized a photothermal agent converting laser light to heat when exposed to 808 nm NIR laser. Also, it can be considered that GO may tightly wrap the MRSA bacteria due its sheet shape and several functional groups on the surface.

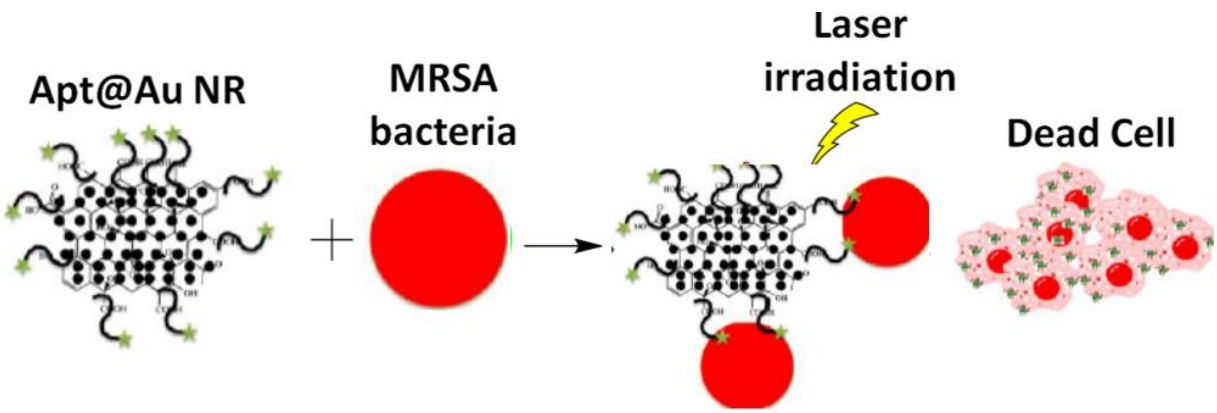

Figure 1. Schematic illustration of reaction of MRSA DNA aptamers mGO and MRSA and the cell death through photothermal therapy

Funding: National Research Agency (12354) (Times New Roman 12)

Acknowledgement: This work is supported by grants awarded by the the Scientific and Technological Research Council of Turkey and the Erciyes University Scientific Research

Office (215Z572 and TSA-2015-6206)

References: (Times New Roman 12)

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