

# Summary of: The rapid diagnosis and effective inhibition of coronavirus using spike antibody attached gold nanoparticles

## Key findings and quantitative results:

- **Naked Eye Colorimetric Diagnosis**: - **Agreement**: The naked eye colorimetric assay can detect COVID-19 antigen within 5 minutes. - **Concentration**: The assay can detect antigen at a concentration of 1 ng/mL for COVID-19 antigen. - **Selectivity**: The assay is highly selective for COVID-19 antigen.
- **SERS (Surface-Enhanced Raman Spectroscopy)**: - **Agreement**: SERS can detect very low concentrations of virus particles. - **Concentration**: SERS can detect virus at a concentration of 18 virus particles/mL. - **Sensitivity**: SERS can detect virus antigen at a concentration of 4 pg/mL.
- **Inhibition Studies**: - **Antibody and Gold Nanoparticles**: - **Inhibition Efficiency**: The anti-spike antibody attached gold nanoparticles have a 100% inhibition efficiency. - **Inhibition Mechanism**: Antibody binding to the virus, blocking ACE2 receptor, and lipid membrane disruption. - **PEG Coated Gold Nanoparticles**: - **Inhibition Efficiency**: PEG-coated gold nanoparticles have a very low inhibition efficiency.
- **Inhibition of SARS-CoV-2**: - **Inhibition Efficiency**: The anti-spike antibody attached gold nanoparticles have a 100% inhibition efficiency. - **Inhibition Mechanism**: Binding to the virus, blocking ACE2 receptor, and lipid membrane disruption.
- **Portable Raman Analyzer**: - **Detection Limit**: The portable Raman analyzer can detect virus at a concentration of 18 virus particles/mL within 5 minutes.
- **Conclusions**: - **Naked Eye Assay**: Rapid, sensitive, and highly selective for COVID-19 antigen. - **SERS**: Highly sensitive for virus detection at very low concentrations. - **Inhibition**: Antibody and gold nanoparticles effectively block virus entry into cells.
- **Quantitative Results**: - **Concentration Dependence**: The assay can detect antigen at a concentration of 1 ng/mL. - **SERS Sensitivity**: SERS can detect virus at a concentration of 18 virus particles/mL. - **LOD (Limit of Detection)**: LOD for SERS assay is 4 pg/mL.
- **Inhibition Efficiency**: - **Antibody and Gold Nanoparticles**: 100% inhibition efficiency. - **PEG Coated Gold Nanoparticles**: Very low inhibition efficiency.
- **Inhibition Mechanism**: - **Binding to ACE2**: Antibody binding to ACE2 receptor. - **Disruption of Lipid Membrane**: Destruction of virus lipid membrane.
- **Inhibition of SARS-CoV-2**: - **Inhibition Efficiency**: 100% inhibition efficiency. - **Inhibition Mechanism**: Binding to ACE2 receptor, disruption of lipid membrane.
- **Inhibition of Pseudovirus**: - **Inhibition Efficiency**: 100% inhibition efficiency. - **Inhibition Mechanism**: Binding to ACE2 receptor, disruption of lipid membrane.

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