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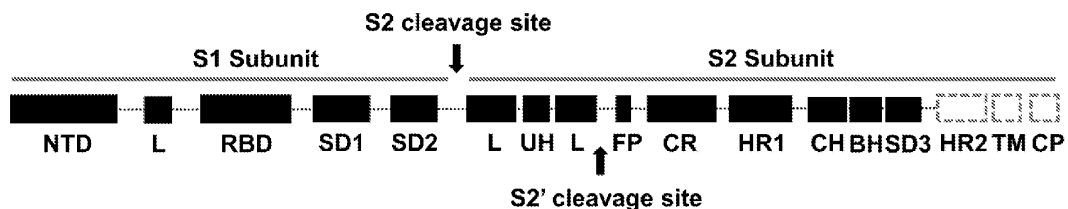
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(54) Title: STABILIZED CORONAVIRUS SPIKE (S) PROTEIN IMMUNOGENS AND RELATED VACCINES

FIG. 1

Coronavirus S1 subunit

NTD, N-terminal domain;
L, linker region;
RBD, receptor-binding domain;
SD1, subdomain 1;
SD2, subdomain 2;

Coronavirus S2 subunit

UH, upstream helix; FP, fusion peptide;
CR, connecting region; HR1, heptad repeat 1;
CH, central helix; BH, β -hairpin;
SD3, subdomain 3; HR2, heptad repeat 2;
TM, transmembrane region/domain;
CT, cytoplasmic tail.

(57) Abstract: The present invention provides redesigned soluble coronavirus S protein derived immunogens that are stabilized via specific modifications in the wildtype soluble S sequences. Also provided in the invention are nanoparticle vaccines that contain the redesigned soluble S immunogens displayed on self-assembling nanoparticles. Polynucleotide sequences encoding the redesigned immunogens and the nanoparticle vaccines are also provided in the invention. The invention further provides methods of using the vaccine compositions in various therapeutic applications, e.g., for preventing or treating coronaviral infections.

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