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(54) Title of the invention : CRYOGENICALLY STABILIZED, PLASMONIC-INTEGRATED DYNAMIC CASIMIR ENERGY CONVERSION DEVICE

(51) International classification	:H01S 5/343, G02F 1/01, G02F 1/35, G02B 6/122, G02F 1/017	(71)Name of Applicant : 1)Chitkara University Address of Applicant :Chandigarh-Patiala National Highway, Village Jhansla, Rajpura, Punjab - 140401, India. Rajpura Punjab India
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(57) Abstract :

A cryogenically stabilized, plasmonic-integrated dynamic Casimir energy conversion device, comprising a hyperbolic metamaterial waveguide 101 fabricated of alternating titanium nitride and silicon dioxide nanolayers, a terahertz (THz) quantum-cascade laser 102 coupled to piezoelectric actuators to incite the nanolayers for generating photons, an epsilon-near-zero resonator 103 operatively coupled to the nanolayers, configured to reduce the group velocity of the generated photons to enhance interaction time of the photons, a plasmonic graphene-hexagonal boron nitride (h-BN) structure 104 for capturing generated photons, an insulator 105 configured to guide surface plasmon polaritons along one-dimensional edge states with reduced scattering and radiative loss, a plurality of tunnelling diodes 106 configured for photovoltaic conversion, a scalable array of phase-locked resonators 107 forming a Quantum coherence array (QCA) configured for coherent power scaling and an artificial intelligence (AI)-based feedback and thermal self-regulation unit 108.

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