
In this research work, the researchers realize a single surface acoustic wave (SAW) actuated bandpass filter that can selectively sort out particles with varying diameters. 15.2 μm polystyrene particles out of 10.2 μm and 19.5 μm ones, 10.2 μm particles out of 8.0 μm and 11.8 μm ones, were validated through this research. Successful acoustic based microparticle filtration will aid in medical diagnostics and biological analysis applications.


The authors presented an automated vision-based mosquito classification module that can be used in closed-areas of mosquito inhabitants. The module is able to identify mosquitoes from other bugs such as bees and flies through retrieving the morphological features, followed by support vector machine-based classification. This method proves to be an efficient alternative to traditional methods for mosquito surveillance, mapping and sample collection.


The research paper recommended an energy policy for an office shared space through an established temperature control device. The energy policy allowed users to be responsible for the “payment” on the energy consumption of the shared office space while users are satisfied either via thermal comfort or through incentives.

Infinite impulse response (IIR) digital filters are commonly employed for digital signal processing, control and communication, as they do not require as much memory and arithmetic operators relative to finite impulse response (FIR) filters. Reduced complexity in IIR filter structure, however, compromises non-linear phase response. To mitigate this, an iterative optimization technique for designing IIR digital filters that had stable group delay was suggested. The designed filter in this study was found to significantly reduce group delay deviation relative to multiple state-of-art IIR design techniques.


Finite element (FE) analysis was proposed because bone mineral density (BMD) scans cannot reliably predict fracture risk in MM patients. FE analysis estimates vertebral bone strength in vitro through multidetector computed tomography (MDCT) images. MM patients with and without vertebral compression fractures were differentiated through FE analysis carried out on vertebrae segments (T1–L5) from MDCT imaging scans. Then, MDCT-based FE models were derived from the in vitro vertebrae samples and were then applied to the in vivo vertebrae segments of MM patients after validation.


For flexible and wearable devices, flexible electrochemical energy storage devices appear to be a good power source. However, it is currently difficult to design an electrode structure that has good flexibility, high capacity, high rate of charging and discharging and long lifetime. Thus the authors designed a three-dimensional (3D) interconnected porous nitrogen-doped graphene foam that had an encapsulated structure. It has high specific reversible capacity, high charging rate and can last up to 1000 charging-discharging cycles.

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In this paper, the authors discussed how transition metal molybdenum (Mo) can be employed as a catalyst in sulphide (SnS2) anode. It was found that in the presence of Mo, Sn can be converted to SnS2 reversibly. Mo catalyst in MoS2 was placed upon self-assembled vertical SnS2 nanosheets upon three-dimensional graphene to produce a new structure with strong electrochemical properties. This was found to increase the lithium storage capability of SnS2.


Read about the design of an ultra-silicon-rich nitride (USRN) in the form of Si7N3 which came about due to bandgap engineering of non-stoichiometric silicon nitride. The designed USRN was found to have high optical parametric gain and high wave-guide conversion efficiency. It is projected that eventually USRNs could be used in high-performance nonlinear optical pulse compressors and low power, ultra-broadband light sources.