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Advancement in Thermoelectric Materials Significantly in Recent Years

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EDITORIAL NOTE

Before the finish of the century, the projected populace and monetary development will dramatically multiply this worldwide energy utilization rate. This interest of progressively enormous commitments to worldwide essential energy supply and the prerequisites due to the danger of environmental change (e.g., clean energy without the outflow of extra ozone depleting substances) characterize the present energy challenge; to look for new, clean and inexhaustible imminent energy assets. Sun powered energy is presently accepted to be the most unmistakable inexhaustible energy sources. Contrasting and other energy assets like exploitable hydroelectric asset, the cumulative energy in every one of the tides and sea flows in the world, and universally extractable breeze power, sun based energy gives around 120,000 TW striking the Earth, which can be taken advantage of on the required scale to fulfil worldwide energy need. All courses for using sun powered energy exploit the useful strides of catch, transformation, and capacity. The improvement of high proficiency thermoelectric materials is one of the significant examination headings for sun based force use. The thermoelectric effect is the phenomena of temperature variations being directly converted to electric voltage and vice versa. Thermoelectric generators convert heat to electricity from a variety of sources, including solar radiation, car exhaust, and industrial operations. Thermoelectric coolers, on the other hand, can be utilised to build refrigerators and other cooling systems. Thermoelectric devices (solid state devices without moving components) have a wide range of applications in infrared sensors, computer chips, and satellites due to their extraordinarily high reliability. The low efficiency of these thermoelectric devices is a disadvantage, limiting their applicability. Thermoelectric devices can be an important element of the solution to today's energy crisis if their efficiency can be greatly increased. As a result, the question of how to improve thermoelectric efficiency becomes a major focus of this research. Unlike several previous extensive reviews on thermoelectric materials, we will concentrate on ways for increasing thermoelectric efficiency, specifically the figure of merit for thermoelectric performance. Several unique proof-of-principle approaches on thermoelectric performance will be discussed, including phonon disordered in phonon-glass-electron crystal, low dimensionality in nanostructured materials, and charge-spin-orbital degeneracy in strongly correlated systems. The thermoelectric cooler or power generator will be more efficient if the figure of merit is higher. As a result, numerous industrial and energy applications are interested in improving figure of merit in thermoelectric materials. Thermoelectric theories and strategies for increasing figure of merit in thermoelectric materials have been examined. Despite numerous breakthroughs in both theory and research in the hunt for better thermoelectric materials, a number of concerns and challenges remain. The advancements in nano-thermoelectric may pave the way for a new path to improved thermoelectric materials, however many concerns remain unanswered. The study of thermos electrics is becoming increasingly relevant in the face of today's energy issues. Due to the interdisciplinary nature of this worldwide competition, collaboration among scientists from many fields will have evident advantages.