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EXPLORING OF THE DEVELOPMENTS IN CRYOGENIC TECHNOLOGIES AND SUPERCONDUCTORS FOR APPLICATIONS IN MEDICAL IMAGING, ENERGY STORAGE, AND TRANSPORTATION

M. Ramesh Kumar[1*], M Rajeswara Rao[2], Bevara Prasada Rao[3]
[1*]Lecturer in Physics, Government degree college, S Kota, Vizianagaram district
[2]Lecturer in Physics, S.V.L.N.S Government Degree College, Bheemunipatnam, Visakhapatnam district
[3]Lecturer in Physics, Government degree college, Cheepurupalli, Vizianagaram District.

***Corresponding Author: M. Ramesh Kumar**
* Lecturer in Physics, Government degree college, S Kota, Vizianagaram district.

Abstract
The equipment and procedures used to generate the low-temperature compartments for both the transportation and storage of liquefied gases are referred to by the term cryogenic technologies. Although this field has continued evolving throughout the 19th century, it is currently seeing unparalleled development spurred by the growing need for cryotechnology across many different industries. To get an in-depth understanding of cryogenic technology, encompassing its history and prospects, continue studying. Now superconductivity refers to a property in Physics where there magnetic fields are a more powerful factor and the electrical resistance of a body disappears.
Superconductivity is a phenomenon that is explained in quantum mechanics in Physics. The total cancellation of the magnetic attraction inside a superconductor as it enters the state is known as superconducting. The Meissner effect indicates that superconducting is more complex than just the conventional physics representation of complete conductivity. In the study, the use of cryogenic technology and superconductivity in the improvement of energy storage and medical imaging has been discussed. The impact of the superconductors on the improvement of the quality of the Transportation system is also been considered in the study.

Keywords- Cryotechnology, Cryogenic technology, Superconductivity, Meissner effect

I. INTRODUCTION
The superconductors are mainly applied in the proceeding of the medical image to Executive “Magnetic resonance imaging or MRI” and the process of “Nuclear Magnetic resonance or NMR”. Using the superconductor in medical images helps to make the magnetic fields that are the most important and vital acid for making the images in MRI machines [3]. The use of superconducting products in the MRI system in performance and also improves the “Spatial homogeneity” in the magnetic field.

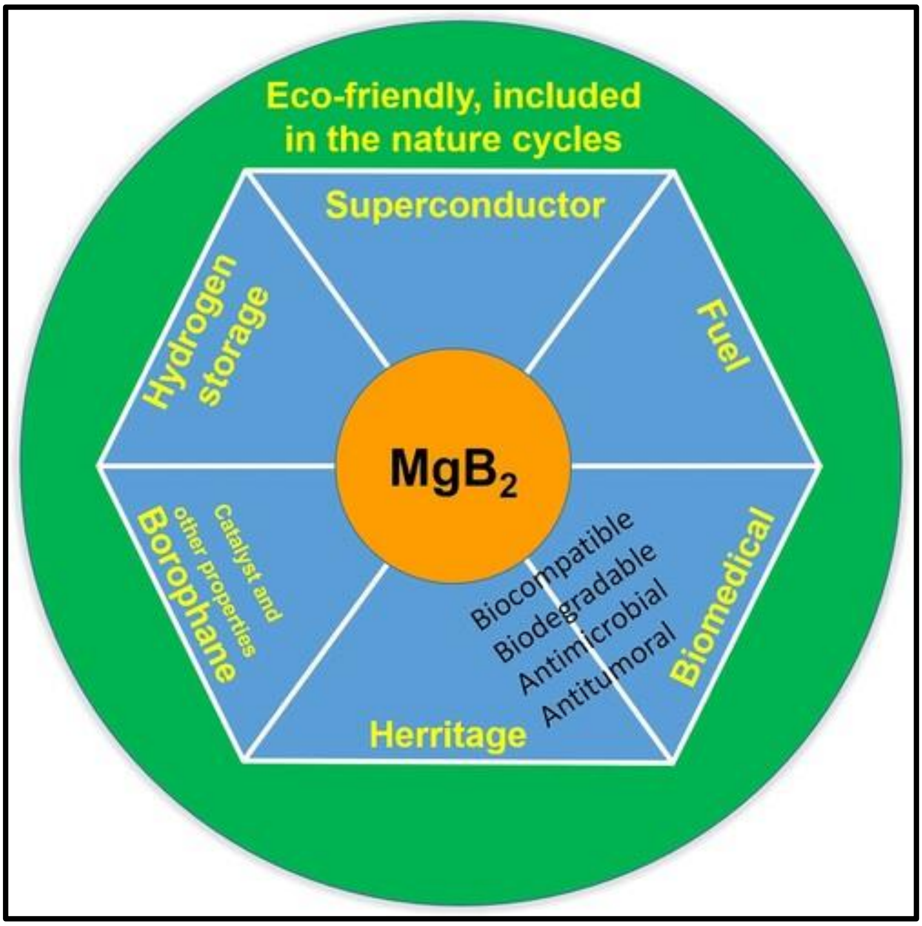

Figure 1: Superconductivity towards the novel biomedical and the energy conservation
(Source: 2)

From the above figure, the use of superconductors in different aspects like the biomedical Ecology system and energy conservation can be detected. From the figure, it can be said that layered material MGB2 is the core element of the superconductors which helps to store the hydrogen and conserve the energy [1]. In Medical applications, the use of cryogenic energy is mainly held for the decrease the temperature and this helps to treat several diseases like viral fever and cancer.

II. OBJECTIVES

The objectives that are developed from the study are:

- To inspect the viability of field-deployable imaging for medical purposes in restricted resources using portable cryotherapy systems
- To examine the advantages of using Technology in the energy storage and Transportation system
- To determine the combining SMES with different energy storage technologies

III. METHODOLOGY

The application of high magnetic field and the superconducting products in the coil winding is increasing way in the current era. The use of Ni-Ti in the industry which is maintained by electric power becomes fully commercialized. Information that is used in the study is collected from a branch of superconductors in Physics and various researches on medical imaging has also been considered in the study [6]. In the Transportation system, the use of cryogenic gases helps to store the fast amount of frozen food.

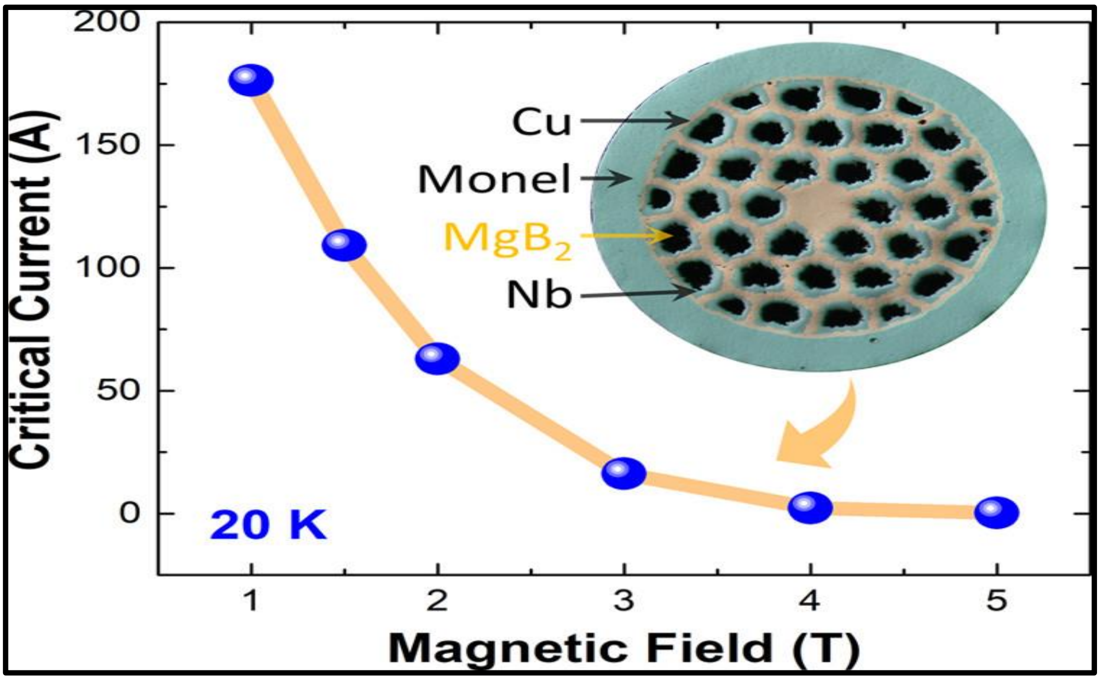

Figure 2: MgB2 Superconducting Joint Architecture with Surround Magnetic Field Screening Capabilities **(Source: 5)**

The above figure depicts the relationship between the critical Garden and the magnetic field for the application of superconductors in architecture. The use of the cryogenic process makes the delivery system easier [10]. The process is mainly done by increasing the coldness with the performance of a chemical reaction.

IV. VIABILITY OF FIELD-DEPLOYABLE IMAGING FOR MEDICAL PURPOSES

Functional imaging is a process that aims at the purpose or activity provided by a radioactive sample. The emission of the photons is in the process of changing the behavior of the radioactive significance. A signal provides an ongoing electrical signal by carrying information about data on the relationship between one parameter and another, usually in the shape of a time-varying voltage. But as the signal is converted or broadcast from a digital to a tangible shape, a parameter necessitates quantized and results in the creation of discrete signals [4].

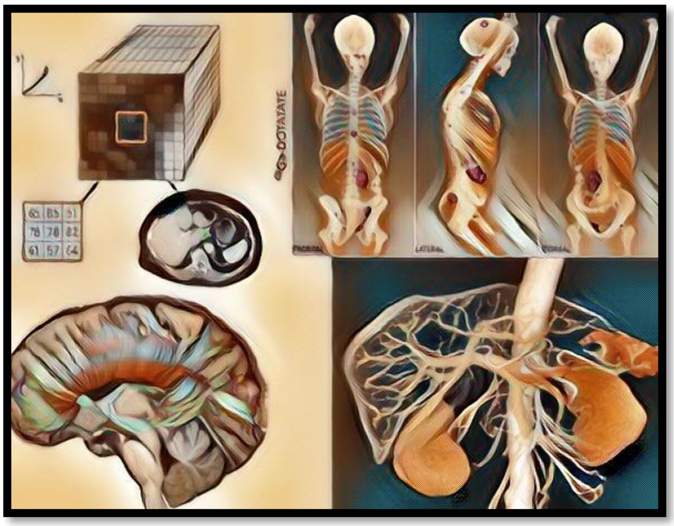

Figure 3: Computer vision and medical imaging

The result of medical imaging and after the use of cryogenic Technology has been shown in the above figure. Reduction of diseases can also be easier with the help of the application of superconductors in medical science.

V. ADVANTAGES OF CRYOGENIC TECHNOLOGY IN THE ENERGY STORAGE AND TRANSPORTATION SYSTEM

There are so many advantages and benefits of the use of “Cryogenic energy storage or CES” to store what amount of energy in the technology system. The ability to use the continuing gas infrastructure, the system's excellent cycling competence, which to its lack of geographical constraints, and the fact that CES is a system that operates without the use of exotic products in order as opposed to batteries, capacitors, etc., are some of the most significant benefits of CES, corresponding to its proponents [8]. The use of CES also makes the equipment more standardized and makes the transportation system more comfortable. The CES process has increased the sustainability and enhanced the durability of the technical tools and items.

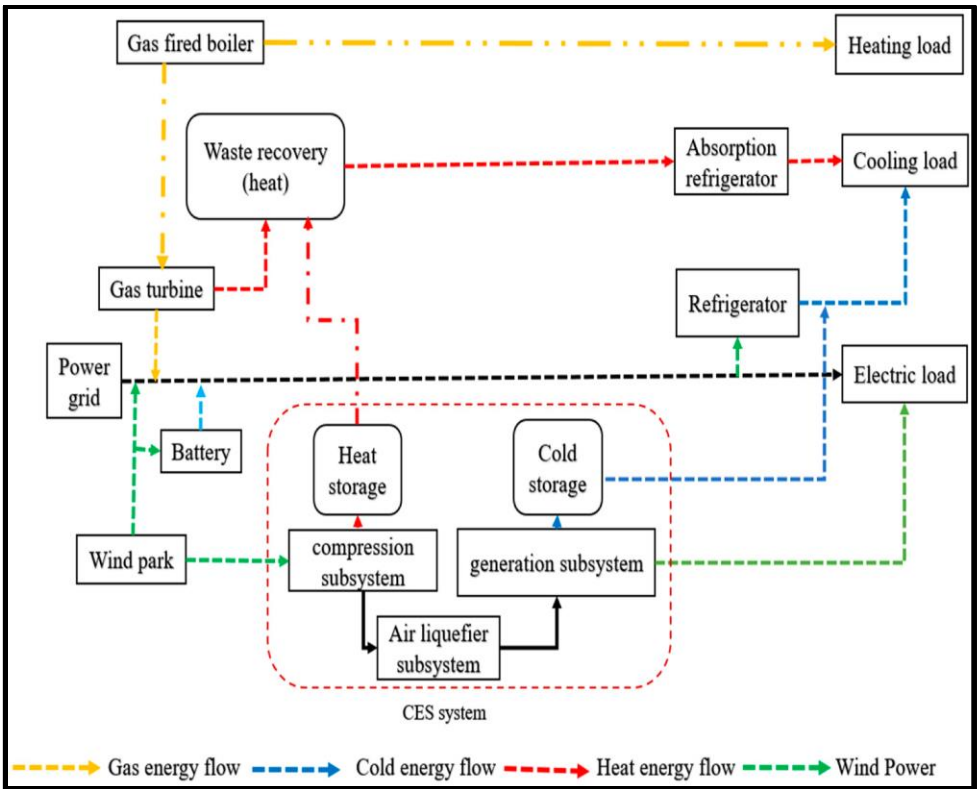

Figure 4: Cryogenic energy storage optimization
(Source: 7)

The optimization of cryogenic energy storage is shown in the above flowchart which includes the gas weird boiler and the absorption of the cryogenic gases by the refrigerator. The flow of energy in this process also includes star gas energy, flow heat energy flow, and also the cold energy flow.

VI. COMBINING SMES WITH DIFFERENT ENERGY STORAGE TECHNOLOGIES

Combining two or additional electricity storage systems or ESSs with comparable characteristics results in a combination of energy storage systems as well, or HESS. The advantageous characteristics of batteries and SMES systems are combined in a hybrid energy preservation system, or BSM-HESS. The main advantage of combining SMEs with different Technologies of energy storage is the improvement of the capability of the energy storage system [9]. The electronic buffers that are included in the same years have a vast capacity to store energy and increase their ability and peak power. Also, SMS helps to decrease the amount of waste in power and energy systems by improving the performance and energy capacity [10]. SMES equipment uses the magnetic field produced by a superconductivity coil's immediate current flow to store a lot of electricity. Therefore, the application of combining SMES is one of the most effective and essential processes for storing energy.

VII. PROBLEM STAEMENT

The main drawback of the study is the lack of proper investigation into the physics related to the technology. The scarcity of data and information about the application of superconductors in energy storage and medical imaging systems is also another drawback of the study. Thus, issues in investigating the impact of cryogenic technologies on the transportation system make the research limited.

CONCLUSION

In conclusion, it can be said that the implementation of cryogenic physics in medical imaging imaging increases the quality of the image in the MRI system. The quality of the computer vision becomes more clear and understandable after the application of the function imaging process which includes the radioactive sample. Hence, the study played an important role in estimating the advantages and benefits of physics in the medical, energy storage process, and transportation systems.

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