



# Yogoda Satsanga Palpara Mahavidyalaya

NAAC Accredited ('B' Grade) and NCTE Recognized (B.Ed. and M.Ed Courses)  
affiliated to  
Vidyasagar University, Midnapore and WBUTTEPA, Kolkata, (Govt. of West Bengal)

At + P.O : Palpara, Dist : Purba Medinipur, PIN Code – 721458, West Bengal, India



## Report for National Science Day Celebration



The transition towards a sustainable energy future hinges on the development and adoption of effective energy storage solutions. To explore the current state and future trajectories of energy storage, a webinar titled "Energy Storage Solutions: Present Day and Future Perspectives" was convened to celebrate National Science Day Celebration. This report synthesizes the insights shared during the webinar, highlighting existing technologies, emerging trends, challenges, and opportunities in the realm of energy storage.

The Webinar "Energy Storage Solutions: Present Day and Future Perspectives" on 28<sup>th</sup> February, 2024 organized by Department of Physics in collaboration with the Institution's Innovation Council (IIC) and Internal Quality Assurance Cell (IQAC), Y.S. Palpara Mahavidyalaya, Palpara. The Session was started with the introductory speech by Dr. Arindam Pal, Head of the Department, Physics & IIC Vice-President of the College. Next, Prof. (Dr.) Pradipta Kumar Mishra, Principal & IIC President of the College delivered a welcome address and the importance of celebration of the Day. Then, our main speaker, Dr. Jagdish Chandra Mahato, Asst. Prof., Department of Physics, Visva-Bharati University, Santiniketan, West Bengal, delivered a full of informative lucid speech on the topic "Energy Storage Solutions: Present Day and Future Perspectives". Around sixty participants are attended the session. And finally, the session was concluded by giving the vote of thanks by Dr. Aminur Rahaman, Asst. Prof., Department of Physics & IIC convener of the College.

The webinar commenced with an exploration of the prevailing energy storage technologies that are shaping the present-day energy landscape.

*Lithium-Ion Batteries:* Lithium-ion batteries emerged as a cornerstone of contemporary energy storage, owing to their versatility and widespread adoption across various sectors. The speakers highlighted the pivotal role of lithium-ion batteries in powering electric vehicles, facilitating renewable energy integration, and bolstering grid stability. However, concerns regarding material scarcity, safety, and environmental impact underscored the need for continued research and development.



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*Pumped Hydro Storage:* Pumped hydro storage was underscored as a stalwart in grid-scale energy storage, utilizing gravitational potential energy for electricity storage and generation. Despite its high efficiency and reliability, speakers acknowledged the geographical constraints and environmental considerations limiting the expansion of pumped hydro storage facilities.

*Compressed Air Energy Storage (CAES):* CAES systems, which leverage compressed air to store energy in underground caverns or depleted natural gas reservoirs, were identified as promising solutions for grid-scale energy storage. While acknowledged for their scalability and relatively low operating costs, speakers cautioned against challenges related to efficiency optimization and site-specific feasibility.

*Flow Batteries:* The webinar also spotlighted the growing prominence of flow batteries, such as vanadium redox flow batteries and zinc-bromine flow batteries, for grid-scale energy storage applications. Speakers lauded the inherent scalability, long cycle life, and decoupled power and energy characteristics of flow batteries. Ongoing research endeavors aimed at enhancing energy density and reducing costs were highlighted as pivotal for their broader adoption.

*Future Prospects and Emerging Trends:* The discussion transcended the present-day landscape, delving into emerging trends and prospective technologies in energy storage.

*Advanced Battery Technologies:* The Speaker Dr. Jagadish Chandra Mahato also delved into the advancements in battery technologies, particularly solid-state batteries and lithium-sulfur batteries. Solid-state batteries garnered significant attention for their potential to mitigate safety concerns associated with liquid electrolytes and enhance energy density and cycle life.

*Hydrogen Storage and Fuel Cells:* Hydrogen storage and fuel cells emerged as transformative technologies poised to revolutionize long-duration energy storage and zero-emission power generation. The speakers highlighted the declining costs of electrolyzers and hydrogen fuel cells, underscoring the growing momentum behind hydrogen as a clean energy carrier for diverse applications.

*Smart Grid Integration and Demand-Side Management:* The webinar emphasized the pivotal role of smart grid integration and demand-side management strategies in optimizing energy storage deployment and operation. Speakers underscored the significance of advanced control



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algorithms, predictive analytics, and real-time monitoring technologies in maximizing the value proposition of energy storage assets and enhancing grid flexibility.

*Challenges and Opportunities:* Amidst the promising outlook for energy storage solutions, the webinar delineated the inherent challenges and opportunities confronting the sector.

*Cost Reduction and Scalability:* Cost reduction and scalability emerged as central challenges impeding the widespread adoption of energy storage technologies. The Speaker Dr. Mahato also stressed the significance of achieving economies of scale, technological innovations, and supportive policy frameworks to drive down costs and facilitate market expansion.

*Integration and Grid Interconnection:* The seamless integration of energy storage systems into existing grid infrastructure posed a multifaceted challenge necessitating coordinated efforts among stakeholders. Speakers emphasized the need for standardized grid interconnection protocols, market mechanisms, and regulatory frameworks to streamline the deployment and operation of energy storage assets effectively.

*Sustainability and Environmental Impact:* Sustainability considerations assumed paramount importance, with discussions revolving around responsible sourcing of raw materials, recycling initiatives, and mitigating the environmental footprint of energy storage technologies. Speakers underscored the significance of adopting holistic lifecycle assessments and implementing sustainability best practices to ensure the long-term viability of energy storage solutions.

## Summary:

The webinar served as a beacon illuminating the multifaceted landscape of energy storage solutions. By elucidating existing technologies, emerging trends, and associated challenges and opportunities, the webinar underscored the pivotal role of energy storage in advancing the transition towards a sustainable energy future. As stakeholders continue to collaborate and innovate, the prospects for energy storage solutions to catalyze transformative change in the global energy landscape appear increasingly promising.

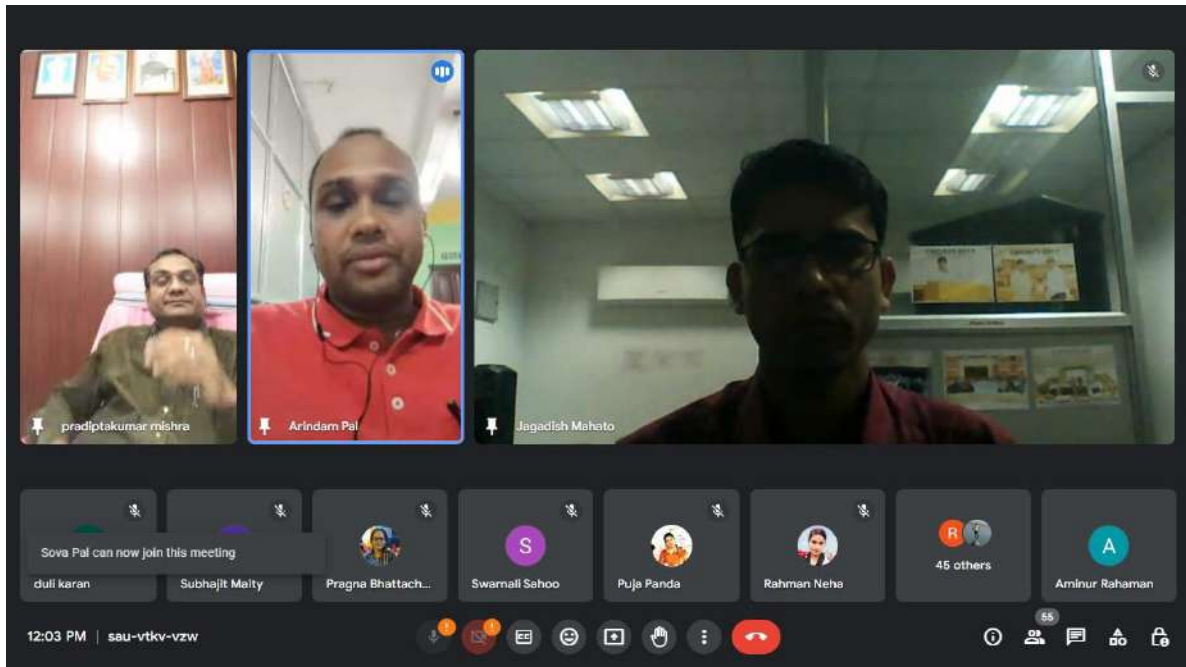


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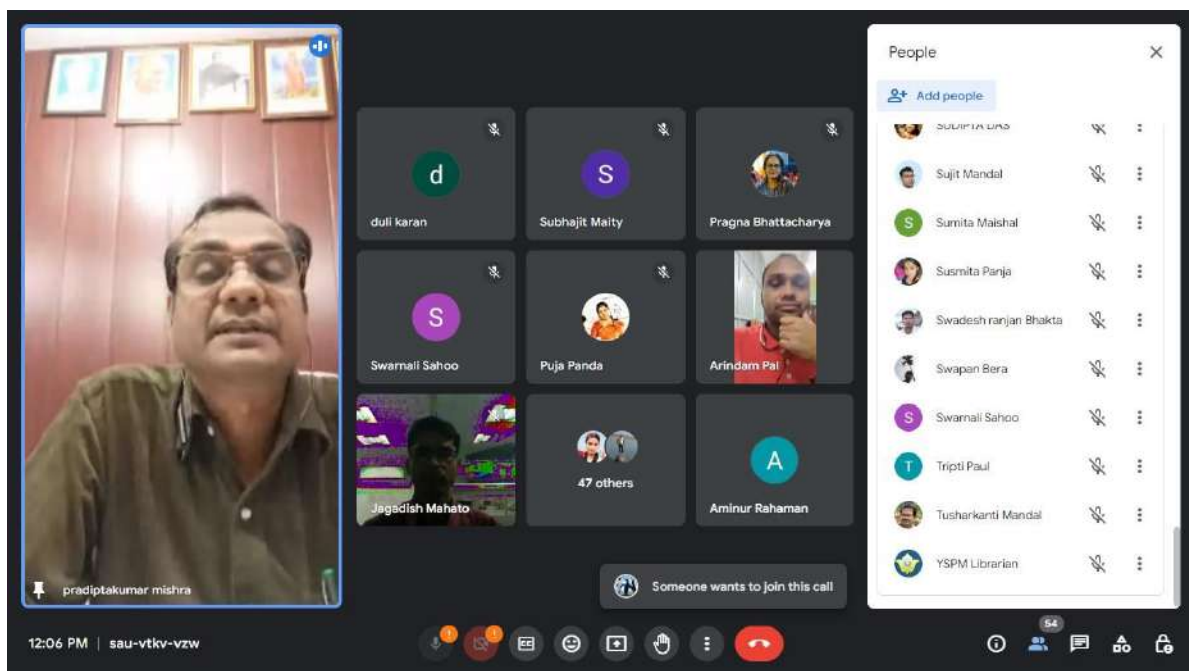
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## Photos of the Session



Dr. Arindam Pal, HOD, Physics & IIC Vice-president gives introductory speech of the Session



Prof. (Dr.) Pradipta Kumar Mishra, Principal & IIC President delivered welcome Address of the Webinar



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Dr. Jagadish Chandra Mahato, Asst. Prof., Department of Physics, Visva-Bharati University, Santiniketan, was delivering the talk

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide with the title "Energy storage solutions in present day and in future". The slide features images of a smartphone, a white car, and wind turbines. Below the images, there is a circular logo with the number "10" and some text in Bengali. The Zoom interface includes a toolbar at the bottom with icons for chat, mute, video, and other controls. The meeting name is "Jagadish Mahato (Presenting)" and the time is 12:15 PM. The participant list at the bottom shows several names, including "dull karan", "Subhajit Maity", "Pragna Bhattach...", "Arindam Pal", "pradipkumar...", "Sawmen Ghorai", "53 others", and "Aminur Rahaman".

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "How does a battery work?". The slide contains a diagram of a battery cell with labels for "Positive terminal", "Negative terminal", "Anode", "Cathode", "Anode current collector", "Separator", and "Cathode current collector". It also shows a table of standard electrode potentials and a diagram of a battery with labels for "Zn", "Aluminum", "NCA", "Separator", and "Graphite". The Zoom interface includes a toolbar at the bottom with icons for chat, mute, video, and other controls. The meeting name is "Jagadish Mahato (Presenting)" and the time is 12:35 PM. The participant list on the right shows names including "Aminur Rahaman", "Jagadish Mahato", "Arindam Pal", "Sawmen Ghorai", "Subhajit Maity", "Pragna Bhattach...", "27 others", and "Aminur Rahaman".



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The screenshot shows a Zoom meeting in progress. The main window displays a PowerPoint slide titled "Battery technologies". The slide contains a graph plotting "Whattoms energy density / Wh/kg" on the y-axis (0 to 7000) against "Mass energy density / Wh/kg" on the x-axis (0 to 800). The graph shows various battery technologies plotted as points or regions, including Lithium metal (Li-metal), Lithium ion (Li-ion), Lead acid, Nickel cadmium, and Emerging technologies. A legend indicates "Excited" (green) and "Emerging" (purple) categories. The slide also lists characteristics of different chemistries and materials.

Participants visible in the meeting include Arindam Pal, Sawmen Ghoral, Subhajit Maity, Jagadish Mahato, Pragna Bhattacha..., Sukanta Ghoral, 34 others, and Aminur Rahman. The meeting time is 12:28 PM | sau-vtkv-vzw.

The screenshot shows a Zoom meeting in progress. The main window displays a PowerPoint slide titled "Summary". The slide contains a list of bullet points summarizing battery technologies, including their potential for low CO2, sustainability, and safety, as well as their material abundance and performance characteristics. The slide also includes small images of battery components.

Participants visible in the meeting include Sujit Mandal, Arindam Pal, Subhajit Maity, RANJAN KHATUA, Arnob Chakraborty, Jagadish Mahato, 18 others, and Aminur Rahman. A notification at the bottom left states "Pragna Bhattacharya has left the meeting". The meeting time is 1:02 PM | sau-vtkv-vzw.



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## Attendees of the Webinar

The screenshot displays a Zoom meeting interface with 58 attendees. The attendees are listed in two columns. The first column shows the following names: Aminur Rahaman (You) Meeting host, Abhijit Mandal, Anjan Sahoo, Arindam Pal, and Arnab Chakraborty. The second column shows: Asish Maity, ayan bhunia, Binod Kr. Sardar, duli karan, Falguni Kuila, Jagadish Mahato, and Madhumita Guchhait. The bottom of the screen shows a navigation bar with icons for info, participants (58), chat, share screen, and lock.

Name	Role
Aminur Rahaman (You)	Meeting host
Abhijit Mandal	
Anjan Sahoo	
Arindam Pal	
Arnab Chakraborty	
Asish Maity	
ayan bhunia	
Binod Kr. Sardar	
duli karan	
Falguni Kuila	
Jagadish Mahato	
Madhumita Guchhait	
Manjushree Adak	
Mithu Panda	
Moumita Das	
Mukulika Das	
Nabarun Mondal	
Nandita Maiti	
Nirmal Bera	
Olivia Mandal Barman	
pradiptakumar mishra	
Pragna Bhattacharya	
Pramita Maity	
Priyanka Bhakta	
Priyanka Pramanik	
Priyanka Rai	



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People X People X People X

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	Puja Panda				Sangita Jana				Sekhar Bera		
	Rahman Neha				Sanjib Dey				Soma Ghorai		
	RANJAN KHATUA				SANTIPADA MAITI				Soumen Bhattacharya		
	S.K Mishra				Sathi Kuyla				Soumili Maikap		
	Sagar Pandit				Satyajit Barik				SOURAV MISHRA		
	Sagar Rcy				Sawmen Ghorai				Sova Pal		
	Sandip Maiti				Sayanti Bagchi				SUBHADIP MAITY		
					Sekhar Bera				Subhajit Maity		

58 58 58

People X People X

+ Add people + Add people

	Subhajit Maity				Sumita Maishal		
	SUDIPTA DAS				Susmita Panja		
	SUJATA SANTRA				Swadesh ranjan Bhakta		
	Sujit Mandal				Swarnali Sahoo		
	Sumita Maishal				Tripti Paul		
	Susmita Panja				Tusharkanti Mandal		
	Swadesh ranjan Bhakta				YSPM Librarian		
	Swarnali Sahoo						

58 58





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Yogoda Satsanga Palpara Mahavidyalaya  
Palpara, Purba Medinipur-721458, West Bengal, India



## National Science Day Celebration

Webinar on "Energy  
storage solutions in  
present day and in  
future"

### Speaker

**Dr. Jagadish Chandra Mahato**  
Asst. Prof., Department of Physics,  
Visva-Bharati University,  
Santiniketan, West Bengal



### Chief Patron

**Prof. (Dr.) Pradipta Kumar Mishra**  
Principal, Yogoda Satsanga  
Palpara Mahavidyalaya,  
Palpara West Bengal



Organized by  
Department of Physics  
in collaboration with  
Institution's Innovation Council  
(IIC) and  
Internal Quality Assurance Cell  
(IQAC),  
Yogoda Satsanga  
Palpara Mahavidyalaya

Date: 28<sup>th</sup> February, 2024

Time: 12.00 PM

Webinar Link:

<https://meet.google.com/sau-vtkv-vzw>



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## Yogoda Satsanga Palpara Mahavidyalaya

Palpara, Purba Medinipur -721458, West Bengal, India



**Webinar on "Energy storage solutions in present day and in future"**

**Organized by Department of Physics in collaboration with Institution's  
Innovation Council (IIC) and Internal Quality Assurance Cell (IQAC)**

### Programme Schedule

DATE	TIME	TOPICS	RESOURCE PERSONS
28/02/2024	12.00 p.m. to 12.15 p.m.	<b>Introductory Speech</b>	<b>Dr. Arindam Pal</b> (Asst. Prof., Department of Physics & IIC Vice- President, Y. S. Palpara Mahavidyalaya)
	12.15 p.m. to 12:45 p.m.	<b>Welcome Address</b>	<b>Prof.(Dr.) Pradipta Kumer Mishra</b> (Principal & IIC President, Y. S. Palpara Mahavidyalaya)
	12:45 p.m. to 02:15 p.m.	<b>"Energy storage solutions in present day and in future"</b>	<b>Dr. Jagadish Chandra Mahato</b> (Asst. Prof. Department of Physics, Visva-Bharati University, Santiniketan)
	02:15 p.m. to 02.30 p.m.	<b>Vote of Thanks</b>	<b>Dr. Aminur Rahaman</b> (Asst. Prof., Department of Physics, & IIC Convener, Y. S. Palpara Mahavidyalaya)



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Date : 20.02.2024

## Notice

It's a pleasure to inform all the students of Y. S. Palpara Mahavidyalaya that Department of Physics in collaboration with the Institution's Innovation Council (IIC) and Internal Quality Assurance Cell (IQAC) of our College is going to organize a session on **"Energy Storage Solutions in Present Day and in Future"** on February 28, 2024 at **12 p.m.** onwards through online mode (Google Meet Link: <https://meet.google.com/sau-vtkv-vzw>). Willing students must have to actively participate in this session.

*Arindam Pal*

HOD, <sup>H.O.D.</sup>Physics  
Department of Physics,  
Y. S. Palpara Mahavidyalaya  
Palpara, Purba Medinipur, W.B

*P. K. Chakrabarti*  
20/02/2024

Principal, Y. S. Palpara Mahavidyalaya  
Principal  
Y.S. Palpara Mahavidyalaya

*Debanjan*

Convener, IIC



# Y.S. Palpara Mahavidyalaya

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Ref No: - *YSPM/PRIN/RP/Physics/518/2024*

Date: 27/02/24

To  
Dr. Jagadish Chandra Mahato  
Assistant Professor  
Department of Physics  
Siksha Bhavana( Institute of Science)  
Visva-Bharati, Santiniketan-731235  
Birbhum, WB, India

**Sub: Invitation as Resourse Person for National Science Day Webinar on " Energy storage solutions in present day and in future" on 28.02.2024 at 12 p.m**

Sir,

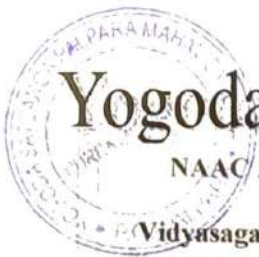
We have pleasure to inform you that the Department of Physics in collaboration with IIC and IQAC of our college is going to organize a National Webinar on "Energy storage solutions in present day and in future" on 28.02.2024. In this regard, you are cordially invited to deliver a lecture as resource Person on the date stated above in online mode (through Google Meet Platform).

Waiting for your kind consent in this regard.

Prof.(Dr.) Pradipta Kumar Mishra  
Principal

Y.S. Palpara Mahavidyalaya

Principal  
Y.S. Palpara Mahavidyalaya



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To  
Dr. Jagadish Chandra Mahato  
Asst. Prof., Department of Physics,  
Visva-Bharati University,  
Santiniketan, West Bengal, India

## Letter of Appreciation

Sir,

We are glad to convey our gratitude by honoring our invitation as an honorable speaker in a session of the National Science Day Celebration on a webinar on “**Energy Storage Solutions in Present Day and in Future**” organized by the Department of Physics in collaboration with the Institution's Innovation Council (IIC) and Internal Quality Assurance Cell (IQAC), Y.S. Palpara Mahavidyalaya, Palpara, Purba Medinipur, West Bengal, on February 28, 2024.

Your speech on the above topic enlightened our participants a lot. Hence, our appreciation with due regard may kindly be acknowledged by you with expecting your kind co-operation in future intellectual discourse.

With Warm Regards,

Prof. (Dr.) Pradipta Kumar Mishra  
Principal

Yogoda Satsanga Palpara Mahavidyalaya

*Principal*  
Y.S. Palpara Mahavidyalaya