

The poster features a dark teal background with several light blue molecular and geometric diagrams. At the top right, there are two logos: 'MANAV RACHNA' with the tagline 'विद्ययांतरिक्षा' and a circular emblem with the number '25'. The main title is in large, bold, white and yellow text. Below the title, a yellow box contains the speaker's name and affiliation. To the right of this box is a portrait of Professor Minna Hakkarainen. At the bottom, a yellow banner displays the date and time.

WEBINAR ON
“BIOBASED, RECYCLABLE AND/OR DEGRADABLE POLYMERS FOR ENVIRONMENTAL, BIOMEDICAL AND PACKAGING APPLICATIONS”

PROFESSOR MINNA HAKKARAINEN,
KTH Royal Institute of Technology,
Stockholm, Sweden

OCTOBER 20 | 1PM - 3 PM

TITLE - Webinar on “Biobased, recyclable and/or degradable polymers for environmental, biomedical and packaging applications”

Date: 20th October 2021

Venue: Online mode

Resource Persons: **Professor Minna Hakkarainen,** *Polymer Technology at KTH Royal Institute of Technology in Stockholm Sweden*

An Expert Talk on “Biobased, recyclable and/or degradable polymers for environmental, biomedical and packaging applications” was organized by the Department of Chemistry, Manav Rachna University on 20th Oct, 2021. Professor Minna Hakkarainen, Polymer Technology at KTH Royal Institute of Technology in Stockholm Sweden delivered the talk which was attended by students of M.Sc. and B.Sc. (Hons) Ph. D Scholars and faculty members from the various universities. .

Dr. Arpit Sand Associate Professor Chemistry welcomed the guest and the audience and introduced the guest speaker and talked about the degradable polymers for environmental, biomedical and packaging applications. More than 50 participants joined the session.

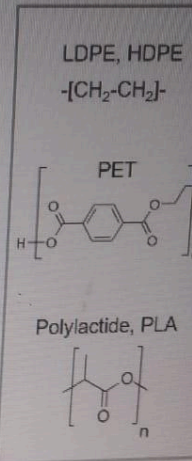
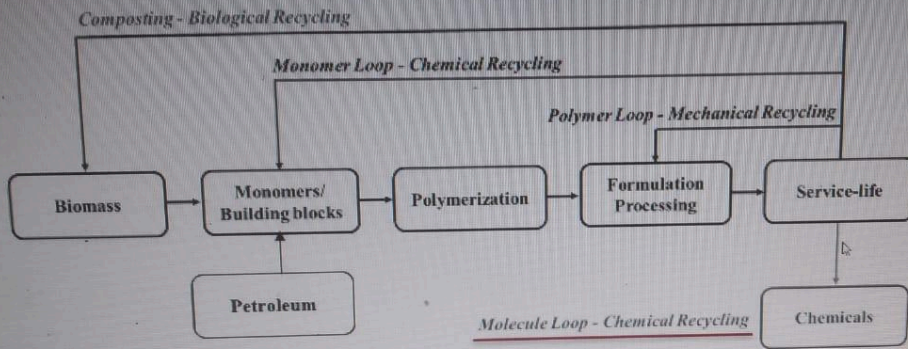
Minna Hakkarainen is professor in Polymer Technology at KTH Royal Institute of Technology in Sweden. She got her M.Sc. in Polymer Chemistry from University of Helsinki in 1992 and Ph.D. in Polymer Technology from KTH in 1996. Since 2011 she is full professor and since 2012 the head of the Division of Polymer Technology at KTH. Her research interest is sustainable polymers including biobased, degradable and/or recyclable polymers for packaging biomedical and environmental applications. She has expertise in degradation of polymers and the interaction of polymers with different environments as well as chromatographic and mass spectrometric analysis of polymer degradation and degradation products. Recent years her main research focus was valorization of polymer waste and biomass to functional chemicals and carbon materials, and further utilization of these products for design of new materials and products. She has participated in or led several national, bilateral and EU-funded projects.

She published ~200 papers in international journals and has >7200 citations, h-index 47 and i10-index 143 (google scholar). She is in Editorial Advisory Board of several journals (e.g. Biomacromolecules, Polymer Testing, SN Applied Sciences, Advances in Polymer Technology).

She initiated her talk by Development of sustainable materials from commodity products to advanced materials required for e.g. healthcare is a challenge facing our world today. This challenge includes not only production of new materials from biobased resources but also turning our waste products into new useful materials as well as making sure the materials developed have no negative impact on us or on our environment during their service life or after disposal. These challenges are the core of my research interests, which include: Recycling of polymers and biomass to value added products, including green chemicals, carbon nanospheres and graphene oxide, and further utilization of these products to design new functional materials, development, characterization and testing of degradable polymers, renewable materials, nano/biocomposites, biomedical materials and environmentally friendly plasticizers



Possibilities for end-of-life management



Polymers are versatile groups of materials
Several solutions needed for end-of-life management

01:03:11 [Microphone icon] [Screen share icon] [More options icon] [Hand icon] [Chat icon] [Call icon]

Minna Hakkarainen (Gäst) (Guest)

+35 [E] [AS] [P] [SK] [R] [Priti] [Minna Hakkarainen]



Starch/CD scaffolds by electrospinning

Process
Starch + CD + formic acid → ST-CD nanofiber

Fiber quality
SEM images and histograms for ST, ST-CD1, ST-CD2.5, ST-CD5.

- High-amylose (70%) maize starch
- NMR confirmed formate formation and almost complete removal of free formic acid
- CD improved electrospinnability and lead to thinner homogeneous fibers

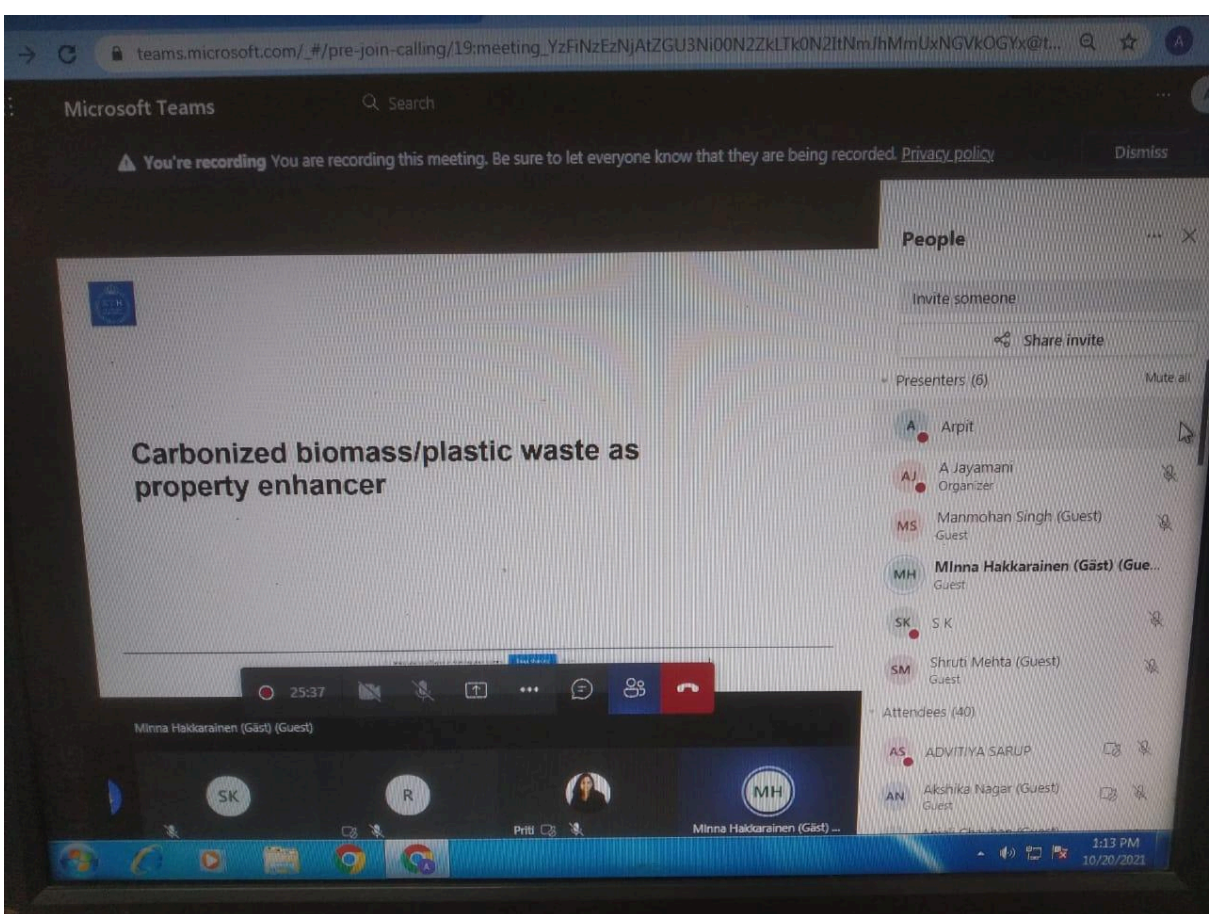
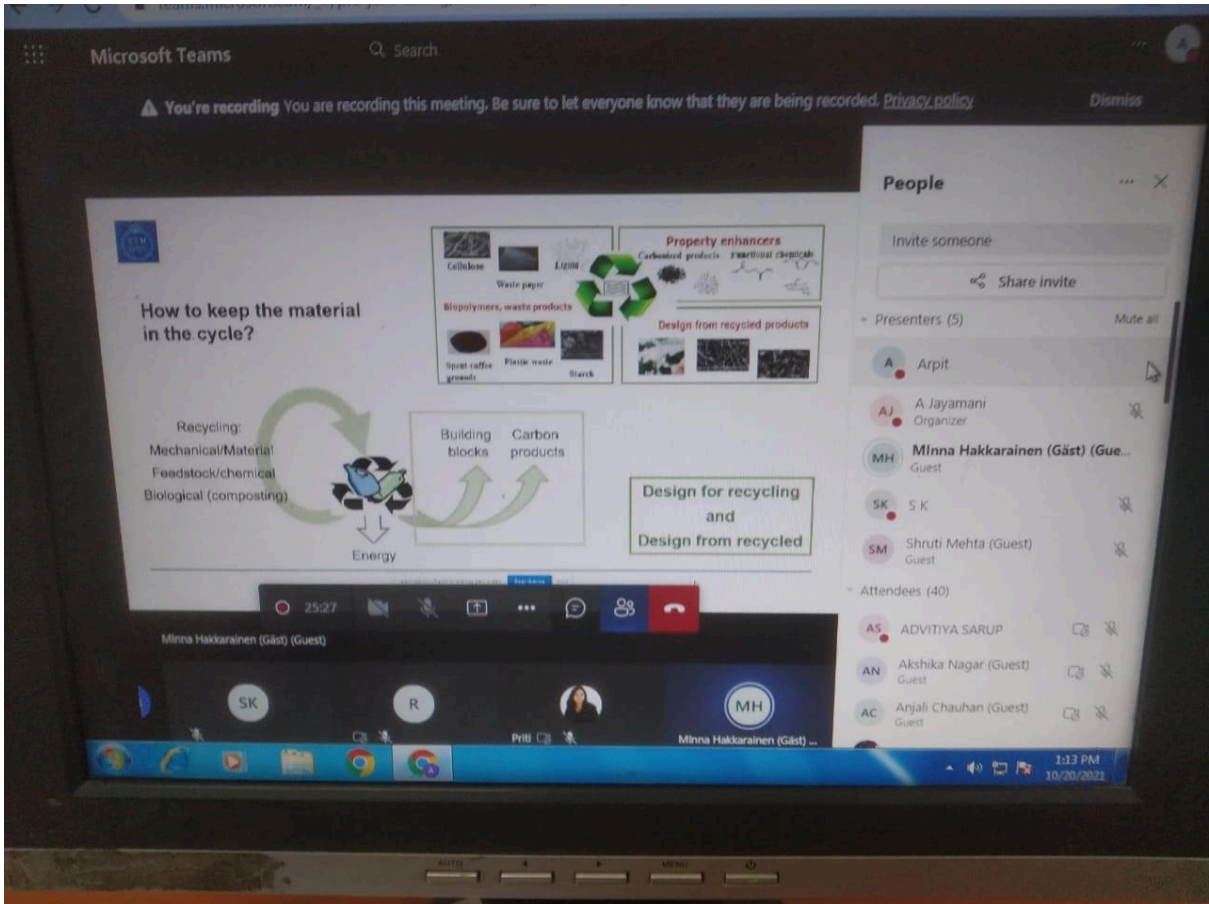
D. Wu, A. Sarmata, R.K. Srivastava, M. Hakkarainen, *Biomol*, 17 (2017) 1906
D. Wu, E. Bäckström, M. Hakkarainen, *Mactamol*, B. Erdal, M. Hakkarainen,

37:17 [Microphone icon] [Screen share icon] [More options icon] [Hand icon] [Chat icon] [Call icon]

Minna Hakkarainen (Gäst) (Guest) [SK] [R] [Priti] [Minna Hakkarainen]

People

- Invite someone
Share in
- Presenters (4)
A Arpit
AJ A Jayamani Organizer
MH Minna Hakkarainen (Gäst)
SK S K
- Attendees (42)
AS ADVITIYA SARUP
AN Akshika Nagar (Guest)
AC Anjali Chauhan (Guest)
Ankit MR



Microsoft Teams Search

You're recording You are recording this meeting. Be sure to let everyone know that they are being recorded. [Privacy policy](#)

(Bio)degradable materials and plastic waste problem

- Correctly designed and used **part of the solution**
- 300 Mt plastic waste produced yearly
- Waste management still needed

Products that:

- are contaminated or difficult to recover or recycle (e.g. food waste contaminated, mulch films)
- have high risk to leak or end up in environment (e.g. textile fibers, fishing nets, cigarette butts, products for garden/agriculture)
- applications where degradation is part of the function

Specific applications

47:05

Minna Hakkarainen (Gäst) (Guest)

SK R Priti MH

People

Invite someone

Share invite

Presenters (4)

- Arpit
- A Jayamani Organizer
- Minna Hakkarainen (Gäst) Guest
- S K

Attendees (43)

- ADVITIYA SARUP
- Akshika Nagar (Guest) Guest
- Anjali Chauhan (Guest) Guest
- Ankit MR

CD modified chitosan hydrogels and microgels

Adsorption of model drug (diclofenac DCF)

Removal efficiency (%) vs Time (h)

Time (h)	GP2hNGO0	GP5hNGO0	GP10hNGO0	GP2hNGO10	GP10hNGO10
0	0	0	0	0	0
10	~80	~85	~90	~95	~98
20	~85	~90	~95	~98	~100
30	~88	~93	~98	~100	~100
40	~90	~95	~99	~100	~100
50	~92	~97	~100	~100	~100

Methyl Orange (MO)

Adsorption efficiency (%) vs Cycle

Cycle	GP2hNGO0_300°C	GP10hNGO0_300°C
Cycle 1st	~95	~90
Cycle 2nd	~90	~85
Cycle 3rd	~85	~80
Cycle 4th	~80	~75
Cycle 5th	~75	~70
Cycle 6th	~70	~65

44:30

Minna Hakkarainen (Gäst) (Guest)

SK R Priti MH

People

Invite someone

Share invite

KONDEPUDI...

MS Manmohan S Guest

MJ Mayank Jain (G Guest

Meena

Megha Mittal

MG Mitali Gupta (Gue Guest

NALLAJARLA_BAA


navin kumar yadra

N Nitin (Guest) Guest

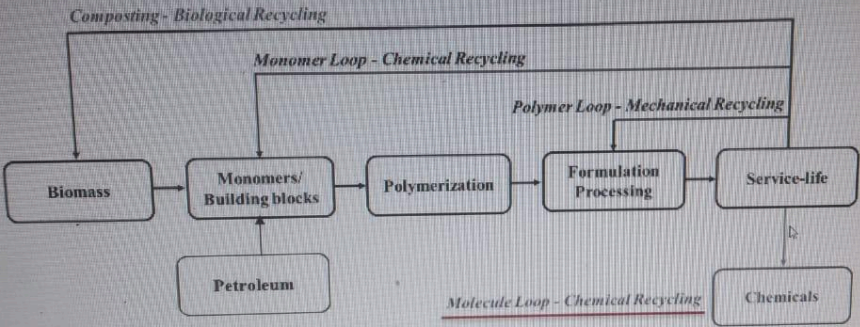
OMMI_PAPARAO

Microsoft Teams

You're recording You are recording this meeting. Be sure to let everyone know that they are being recorded. [Privacy policy](#)



Possibilities for end-of-life management



LDPE, HDPE
-[CH₂-CH₂]-

PET

$$\left[\text{H}-\text{O}-\text{C}(=\text{O})-\text{C}_6\text{H}_4-\text{C}(=\text{O})-\text{O}-\text{H} \right]_n$$

Poly lactide, PLA

$$\left[\text{CH}_2-\text{CH}(\text{C}(=\text{O})\text{CH}_3)-\text{O} \right]_n$$

Polymers are versatile groups of materials
Several solutions needed for end-of-life management

01:03:09


Minna Hakkarainen (Gäst) (Guest)

+35 E AS P SK R Priti Minna Hakkarainen

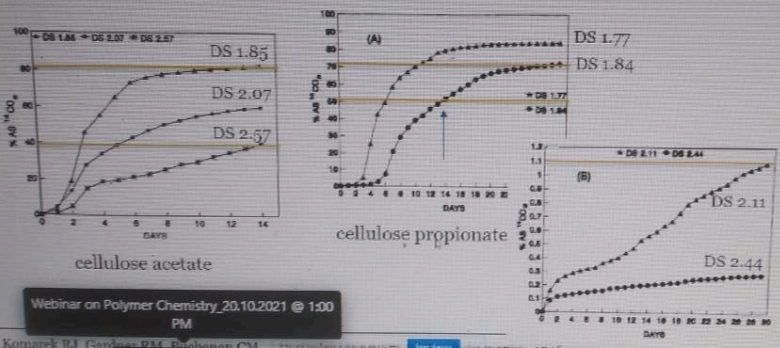
teams.microsoft.com/_/#/pre-join-calling/19:meeting_YzFINzEzNjAATZGU3Ni00N2ZkLTk0N2ItNmJhMmUxNGVhOGYx@t...

Microsoft Teams Search

You're recording You are recording this meeting. Be sure to let everyone know that they are being recorded. [Privacy policy](#)



Biodegradation of cellulose acetates and cellulose propionates by mixed microbial population



cellulose acetate

cellulose propionate

Webinar on Polymer Chemistry_20.10.2021 @ 1:00 PM

03:01

Minna Hakkarainen (Gäst) (Guest)

SK R Priti Minna Hakkarainen (Gäst)

People

Invite someone

Share invite

Presenters (4)

- Arpit
- A Jayamani Organizer
- Minna Hakkarainen (Gäst) Guest
- S K

Attendees (42)

- ADVITIYA SARUP
- Anjali Chauhan (Guest) Guest
- Ankit MR
- Anuradha (Guest) Guest