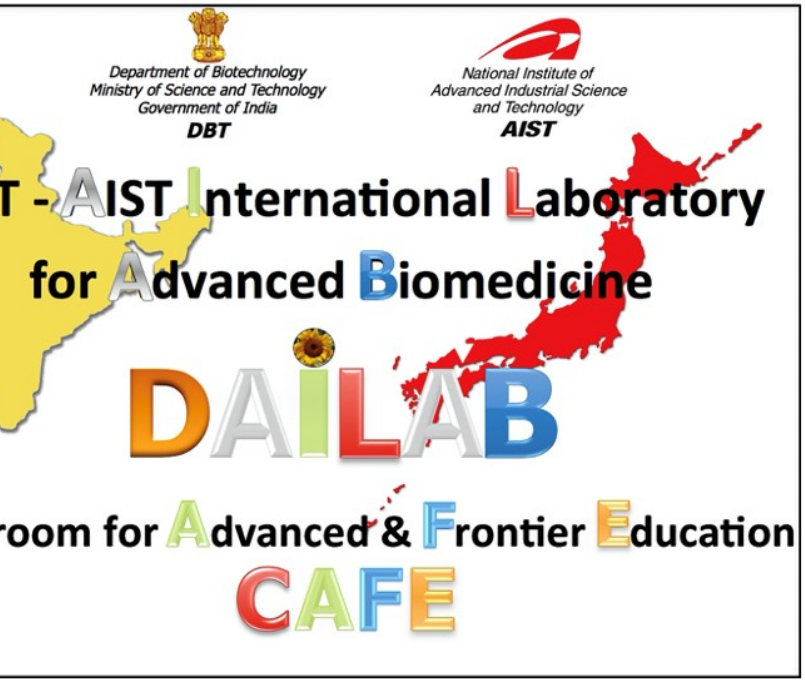

DAILAB CAFÉ

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Time: July 16, 2020 (3PM (JST))
: Yue YU
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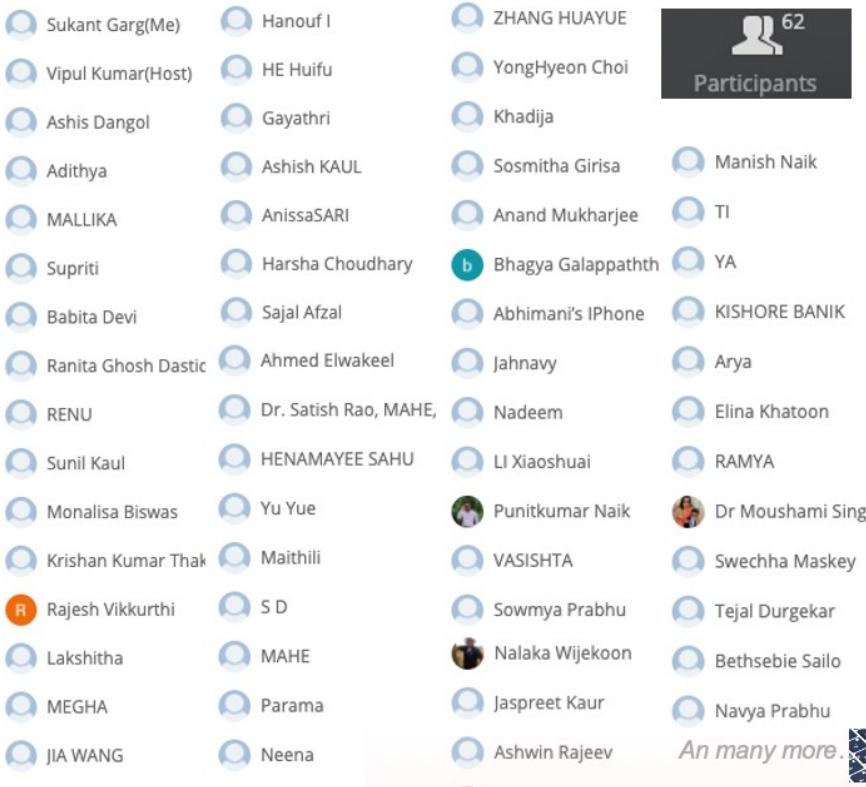
Optical control of cancer stemness with nanocarbon complexes

trategies for eradicating cancer stem cells (CSCs) are urgently required, because CSCs are resistant to cer drugs and cause treatment failure, relapse and metastasis. Here we show that photoactive functional rbon complexes exhibit unique characteristics, such as homogeneous particle morphology, high water bility, powerful photothermal conversion, rapid photoresponsivity and excellent photothermal stability. In , the present biologically permeable second near-infrared (NIR-II) light-induced nanocomplexes photo- ly trigger calcium influx into target cells overexpressing the receptor potential vanilloid family type 2). This combination of nanomaterial design and genetic engineering effectively eliminate cancer cells and s stemness of cancer cells in vitro and in vivo. Finally, in molecular analyses of mechanisms, we show nhibition of cancer stemness involves calcium-mediated dysregulation of the Wnt/β-catenin signalling y. The present technological concept may inspire innovative cancer therapies in future.



*Live online, via 'Zoom', From **AIST, Japan***

DAILAB (DBT-AIST International Laboratory for Advanced Biomedicine) CAFÉ (Classroom for Adv and Frontier Education) is held once in six weeks and provides a relaxed CAFÉ-like environment for stu learning. This is a Classroom setting rather than a lecture on data presentation. Frontier topics are selec CAFÉ talks that are presented by eminent scientists on an educational level and are skyped to all the ov institutions (DAILAB CAFE and its Satellites). Participating Institutions include AIST (Tsukuba, Japan), IIT (India), Hanyang University (South Korea), Peking Medical University (China), Brawijaya University (Indo Manipal University (India), IIT-Guwahati (India) and Guru Nanak Dev University (India). Dr. Yue Yu is a member at the AIST (Osaka campus), and is committed in exploring the cancer cell stemness mechanisms nanocarbon-based technology.

Strategies for eradicating cancer stem cells (CSCs) are urgently required, because CSCs are resis anticancer drugs and cause treatment failure, relapse and metastasis. In the present study, Yue et al shown that the photoactive functional nanocarbon complexes exhibit unique characteristics, su homogeneous particle morphology, high water dispersibility, powerful photothermal conversion, photoresponsivity and excellent photothermal stability. In addition, the present biologically permeable s near-infrared (NIR-II) light-induced nanocomplexes photothermally triggered calcium influx into targe overexpressing the receptor potential vanilloid family type 2 (TRPV2). This combination of nanomaterial and genetic engineering effectively eliminated cancer cells and suppressed stemness of cancer cells *in vi in vivo*. Finally, in molecular analyses of mechanisms, they showed that inhibition of cancer stemness in calcium-mediated dysregulation of the Wnt/β-catenin signaling pathway. The present technological conce inspire innovative cancer therapies in future.