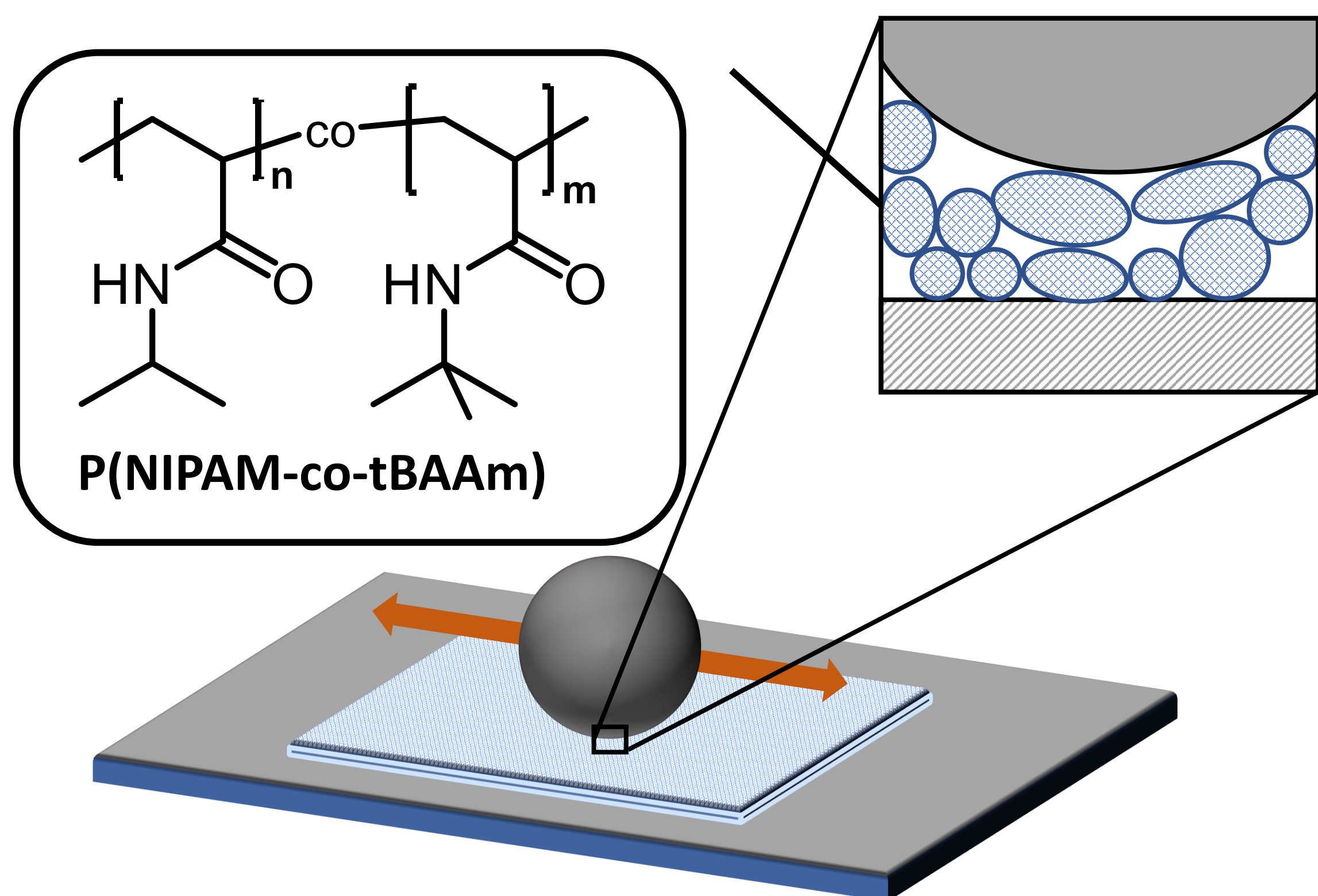


# Hydrogel nanoparticles for reduction of friction

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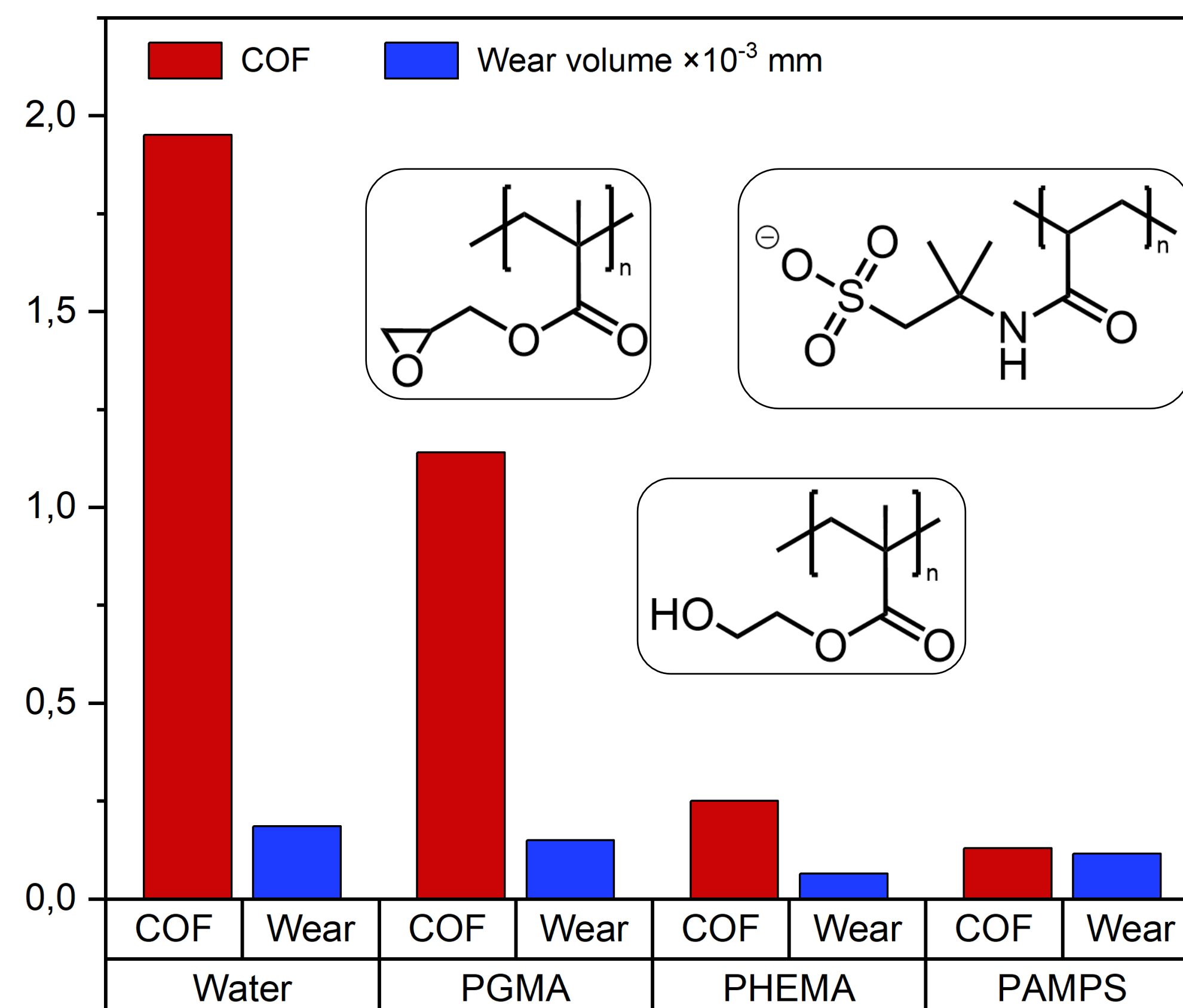
<sup>2</sup>Indian Institute of Technology, Department of material science and engineering, India

## Reduction of friction by rolling over hydrogel nanoparticles



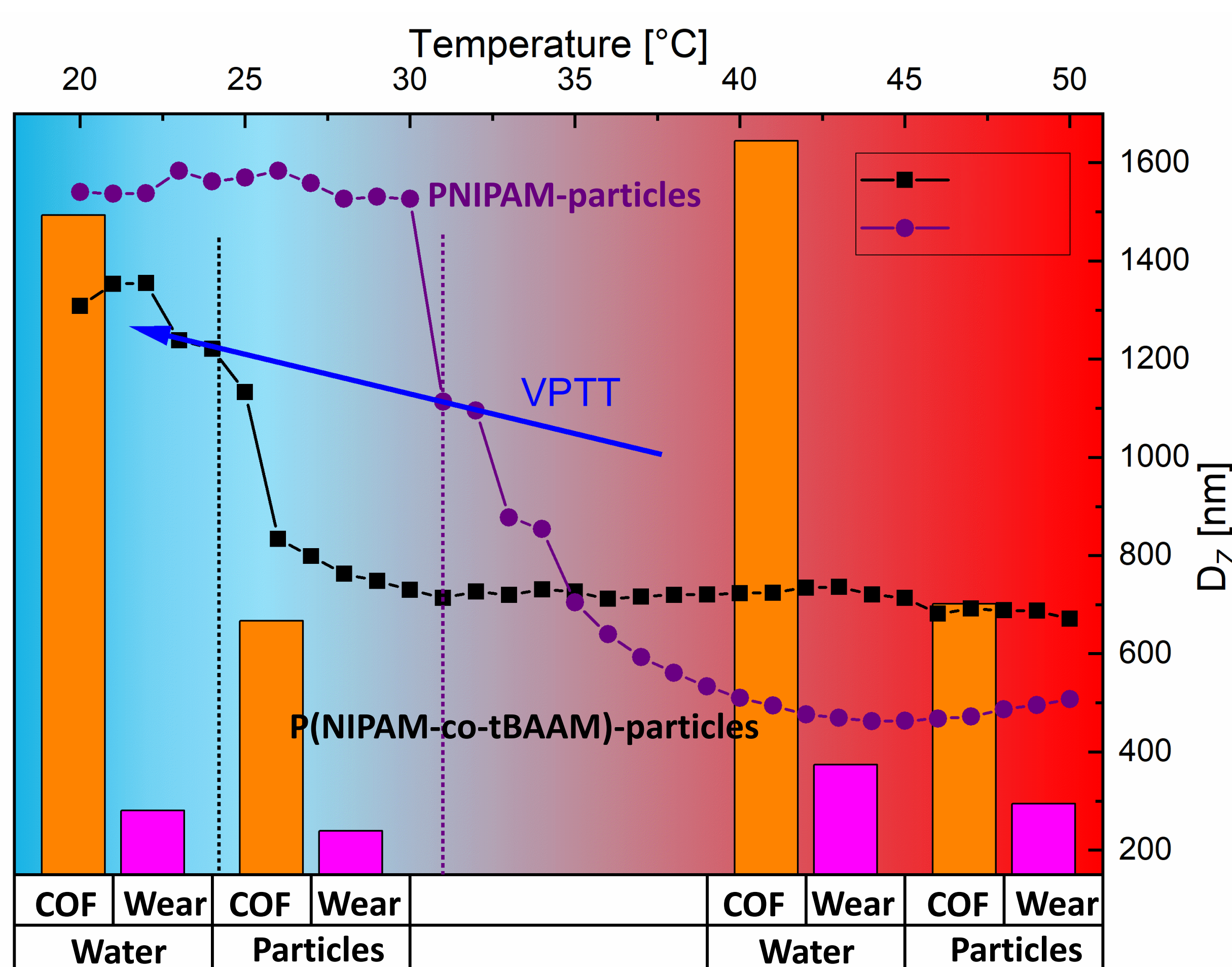
Hydrogel nanoparticles are considered to behave as small spheres, thereby preventing direct surface-to-surface contact and instead reduce friction. We are studying the influence of hydrogel particles of different chemical composition on water based lubricants. The particles are easily accessible via emulsion polymerization.

## Different chemical compositions eligible



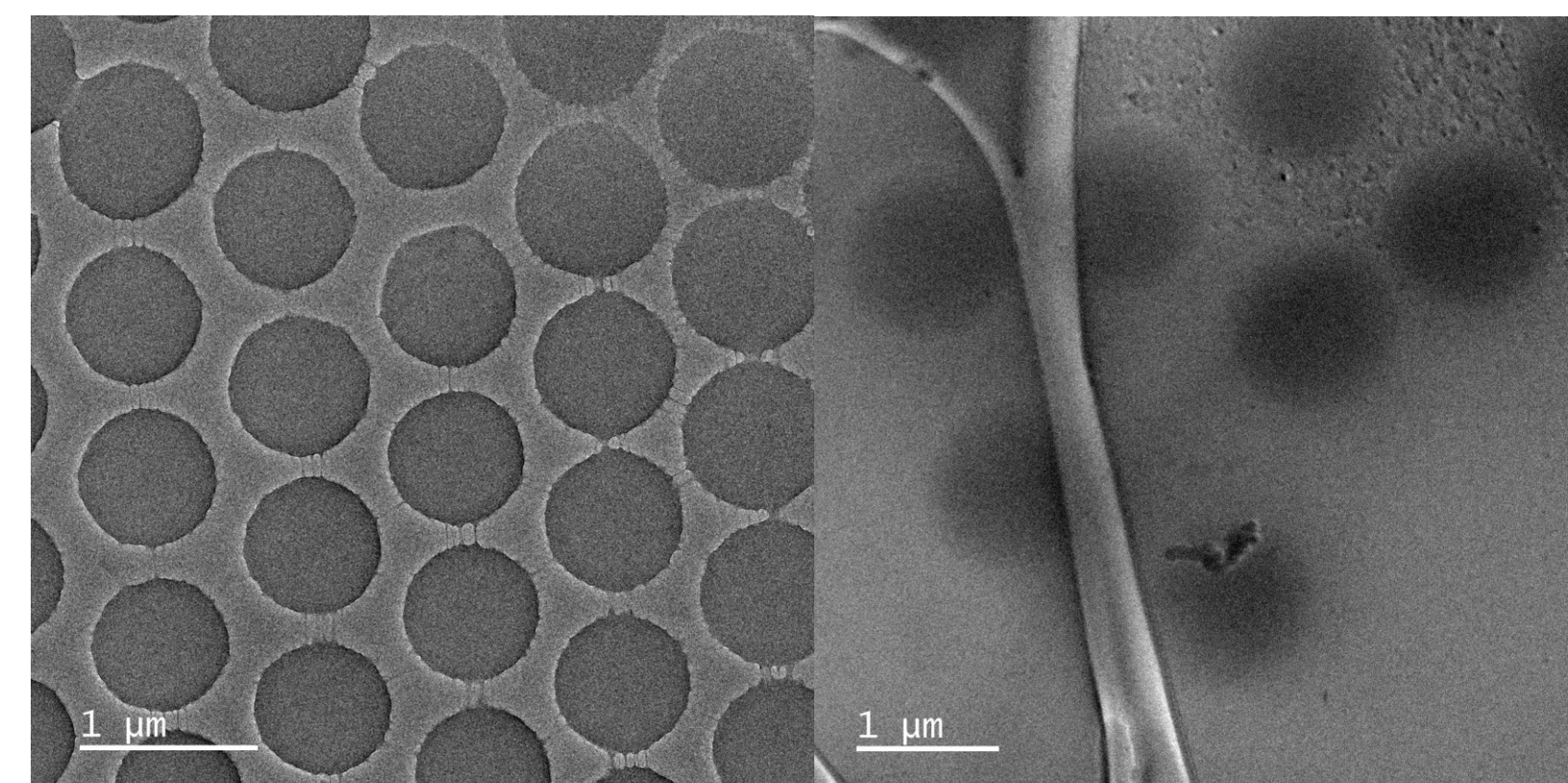
Not only PNIPAM gels are promising lubricant additives. Dependent on the requirements the chemical composition can be changed.

## Temperature sensitive particles maintain tribological behavior at different temperatures



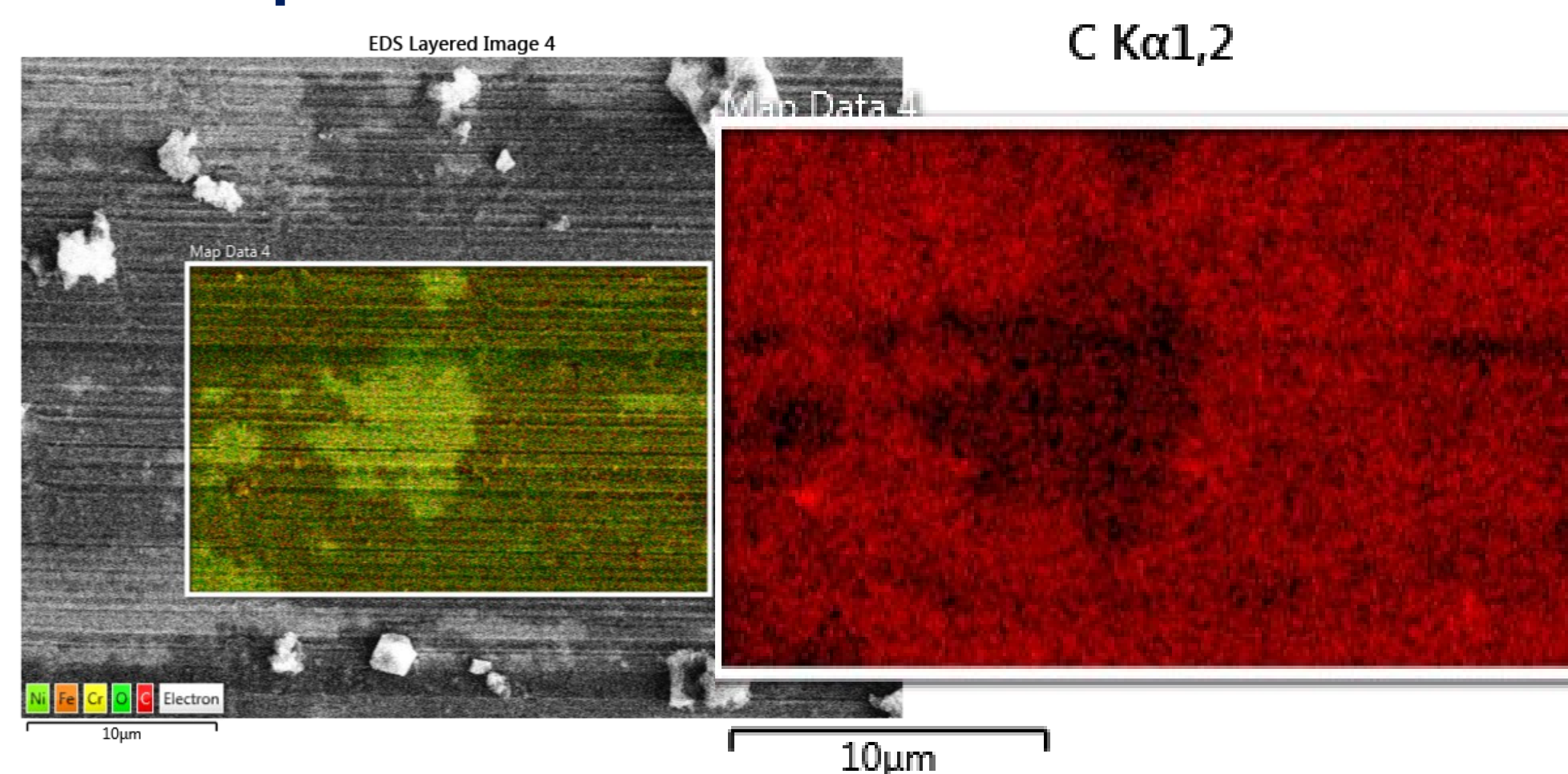
By adjusting the amount of tert-butylacrylamide (tBAAm) the VPTT can precisely adjusted without any effects on the lubricating effect. This might be of interest in applications where release of a substance is necessary.

## (cryo-)TEM reveals highly monodisperse spheres



TEM images (left) and cryo-TEM (right) of PNIPAM nanoparticles. Representative for all particles. TEM images have been taken at University Bielefeld.

## SEM and EDS images after tribological tests confirm formation of tribofilm by abrasion and decomposition



EDS mappings show carbon deposition at localized regions on the wear scar surface. This tribofilm reduces surface roughness and friction.

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