

TCS/24/08 - Targeted, Stimuli-Responsive Delivery of Senolytics from Metal-Organic Frameworks

Age-related health increasingly affects the length and quality of life in our ageing population. Drugs which target old cells that have been shown to cause age-related diseases – senescent cells – have been shown to mitigate the effects of ageing in clinical models, but these “senolytic” drugs often have undesirable side-effects or have poor efficacy as they do not solely target senescent cells. The proposal seeks to use drug carriers – porous nanoparticles known as metal-organic frameworks (MOFs) – to deliver senolytic drugs specifically to senescent cells while avoiding healthy cells. We will incorporate chemical machinery onto the surfaces of the MOF nanoparticles that will be degraded by a specific enzyme that is overexpressed by senescent cells, ensuring the senolytic is only released into senescent cells. This selective release will enhance efficacy, lower off-target effects, and lay the platform for a larger program into targeted delivery of senolytic drugs against age-related disease.