Technology for manufacturing alumina ceramic based femoral head and cup (alumina ceramic or PE) for total hip replacement (THR)

IPR STATUS
Patent sealed

APPLICATION/ USES
Healthcare; Total hip replacement (THR) implants based on ceramic head and ceramic/ polymer acetabular cup

SALIENT FEATURES
Dense alumina (Al_2O_3) based modular femoral head with matching cups (liners) of different diameters to suit commercially available hip stems for total hip replacement (THR). The ceramic head is being used again ceramic cup (ceramic-on ceramic) with significantly less wear loss compared to metal-on-PE system. Optionally, ceramic head can be used with commercially available highly-crosslinked ultra-high molecular poly-ethylene liner/ acetabular cups.

Ceramic head: In compliance with ISO Spec. Density: > 3.90 g/cc; Hardness: ~ 19 GPa; Compressive strength: ~ 1200 MPa ; Burst strength: ~ 60 kN; Fracture toughness: ~ 3 $MPa.m^{1/2}$; Surface finish (Ra): ~ 0.05 μm

- Affordable and state-of-the-art healthcare solution.
- Both femoral head and cup are biologically and chemically inert, non-toxic, biocompatible and needs almost no replacement while the conventional metallic ones give rise to local infection occasionally, prone to chemical corrosion in body fluid, need replacement after regular intervals of 10 years.
- The articulating surfaces being harder than conventional ones would offer better wear resistance and therefore longer service life when used in different combinations of ball and cup.
- Different designs of commercially available stems (made of either SS 316 L or Ti-6Al-4V alloy) can be safely used with this ceramic femoral head and cup.

LEVEL/ SCALE OF DEVELOPMENT
Commercialized product (ceramic-to-polymer); Commercialized through industry partner
Completed single-centric clinical trials (ceramic-to-ceramic)

LINE MINISTRY MAPPING/ USER SECTOR
Ministry of Health & Family Welfare