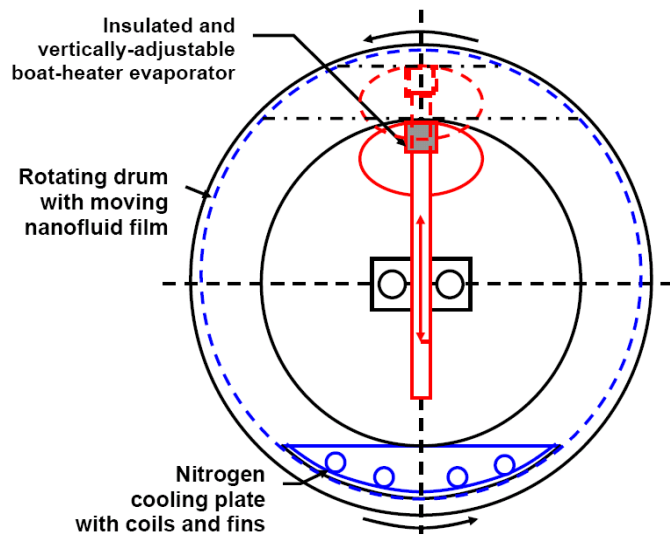


interactions (collaboration with NIU Chemistry) will be very useful for understanding of underlying



**Fig. 5:** Improved, Teflon-coated Platinum Hot-Wire Thermal Conductivity (HWTC) cell for nanofluid TC measurements [15].



**Fig. 4:** Improved, patent-pending new-design for the one-step, direct-evaporation nanofluid production apparatus [13].

phenomena and optimization of development/design/production of nanofluids with desired, enhanced thermo-physical properties. The improved methods are being developed to integrate drag-reducing polymer additives with metal and metal- and carbon-based composite-nanoparticles in common base fluids, and for the first time, to produce polymer-nanofluids, with not only observed heat transfer enhancement, but equally importantly, with improved flow-friction characteristics. Ultimately, thermo-physical properties and macroscopic flow and heat-transfer characteristics of the polymer-nanofluids will be investigated [14]. This research will lead to the development of improved and new methods for production and characterization of diverse, complex nanofluids with polymer additives. Improved theoretical understanding of complex nanofluids, and diverse processes in nanofluids will have an even broader impact. Nature is full of nanofluids, like blood, a complex biological nanofluid where different nanoparticles (at molecular level) accomplish different functions, and where nanofluid components actively respond to their local environment. Many mining and manufacturing processes involve waste products that consist of mixtures of nanoscale particles with fluids. A wide range of active self-assembly mechanisms for nanoscale structures start from a suspension of nanoparticles in fluid. Beyond the primary goal of producing enhanced flow and heat-transfer nanofluids, this research could lead to important developments in bio-medical applications,